

CHILD PSYCHOLOGY

BY

FOWLER D. BROOKS

PROFESSOR OF PSYCHOLOGY AND HEAD OF DEPARTMENT OF PSYCHOLOGY
DEPAUW UNIVERSITY
AUTHOR OF "THE PSYCHOLOGY OF ADOLESCENCE"

WITH THE COLLABORATION OF

LAURANCE F. SHAFFER

PROFESSOR OF PSYCHOLOGY
CARNEGIE INSTITUTE OF TECHNOLOGY



HOUGHTON MIFFLIN COMPANY

BOSTON • NEW YORK • CHICAGO • DALLAS

ATLANTA • SAN FRANCISCO

The Riverside Press Cambridge

COPYRIGHT, 1937

BY FOWLER D. BROOKS

ALL RIGHTS RESERVED INCLUDING THE RIGHT TO REPRODUCE
THIS BOOK OR PARTS THEREOF IN ANY FORM

The Riverside Press

CAMBRIDGE MASSACHUSETTS

PRINTED IN THE U.S.A.

'FO
S. N. B.

EDITOR'S INTRODUCTION

THIS book presents a clearly organized and, for a single volume, a surprisingly comprehensive and yet lucidly written survey of the psychology of the young developing human individual.

Child psychology is important for at least three reasons: first, it deals with the period of mental life that is scientifically interesting and significant in its own right; second, it provides an indispensable body of fact which alone makes possible the real understanding of many adult psychological characteristics that otherwise seem to be outside the deterministic bounds of science; and third, it forms one important foundation for many fields of application, including education, social work, mental hygiene, and parenthood.

The recent and relevant literature in the field covered by this book is extensive. The task of bringing this material together has not been interpreted as one of mere compilation. On the contrary, the material has been so organized and evaluated that a coherent picture is presented of the many-sided mental life of the immature human being.

Above all, this book will recommend itself to the serious student of childhood because of its broad biological background and inclusive scope. A mere consideration of the number of references cited and the wide variety of topics listed in the table of contents will show how much more adequately this volume covers this field than has been true in the case of any book on childhood which has been written from the standpoint of any one of the special schools of psychology.

Here are considered the mechanisms of heredity and the prenatal and postnatal development of structure and function in the living human individual. There is included also a consideration of forms of activity of the child which are specifically a result of contact with the social system into which each child

is developing. In the latter part of the book, in which these influences of society, and especially of modern American life, are emphasized, a positive consideration is given to what may be called the applied psychology of childhood.

The student will find in this book an unusually large number of clearly marked signposts pointing down interesting paths for further study and investigation. It is a real introduction to a modern and most important field.

PREFACE

TO EACH generation is given the perennial task and responsibility of providing suitable education and training for its young. The accumulating mass of evidence from a wide variety of sources indicates the fundamental importance of the child's growth and development during the first dozen years of his life for his later health, happiness, and effectiveness.

This volume, covering the first twelve years of the child's life, has been prepared in response to numerous requests for a companion volume to the author's *Psychology of Adolescence*. It has been developed in connection with courses and addresses on Child Psychology given by the author. Several hundred undergraduate and graduate students, elementary teachers, and principals in the author's classes at Johns Hopkins and DePauw universities and in summer sessions at the universities of Cincinnati, Southern California, and Wisconsin have influenced it through questions, discussions, and conferences. An equally large number of parents and teachers have had an important part in its development through discussions and conferences in parent-teacher, child study, and A.A.U.W. groups.

Adequate, valid evidence is lacking on many important problems of child growth and development and upon them further research is needed. We have raised many questions to which conclusive answers cannot now be given. We have sought, however, to present the available evidence without bias so that the reader may draw his own conclusions. We have sought to reduce statistical details to a minimum consistent with adequate presentation of topics.

A brief glossary is included at the end of the volume immediately before the index. At the end of each chapter a few selected references are given. At the end of the volume, before the glossary, many additional references are given which are supplementary to those at the end of each chapter and in

footnote citations throughout the book. These serve as an introduction to the vast, growing literature on the subject.

The author is under obligation to the many investigators from whose researches extensive data have been drawn. His use of materials from general, experimental, clinical, abnormal, and educational psychology and from mental hygiene indicates the close connection of child psychology with the entire subject. The author also is under obligation to the authors and publishers who have granted permission to use copyrighted materials. Specific acknowledgments are made in all cases.

The author is under obligation to Dr. L. F. Shaffer, who read the manuscript, made many suggestions for its improvement, revised several sections, and contributed some material on heredity, emotion, motivation, and personality adjustments.

FOWLER D. BROOKS

CONTENTS

CHAPTER	PAGE
I. PROBLEMS AND METHODS OF CHILD PSYCHOLOGY	1
PROBLEMS OF CHILDHOOD	1
The Significance of Childhood — The Field of Child Psychology	
INADEQUATE OLDER METHODS OF STUDYING CHILDREN	3
The Importance of Sound Methods — Superficial, Uncontrolled Observation — Anecdotal Biographies — Reminiscences — Questionnaires	
UNRELIABLE THEORIES OF CHILD NATURE	6
How Fallacious Theories Arise — Some Early Theories — The Recapitulation Theory — Other Speculative Theories	
THE SCIENTIFIC APPROACH TO CHILD PSYCHOLOGY	10
Scientific Method — Systematic Biographies — Case Studies — Directed Observation — Measurement — Statistical Methods — Experiment — Progress in Methods	
SELECTED REFERENCES	17
II. THE ORIGINS OF CHILD BEHAVIOR	19
HEREDITY	20
Germ Cells — Mendelian Heredity — Other Principles of Heredity — Blended Inheritance — Hereditary Determiners and Environmental Influences — Human Heredity	
THE PRENATAL DEVELOPMENT OF STRUCTURE	29
The Germinal Period — The Embryonic Period — The Fetal Period — The Development of the Nervous System — Laws of Structural Development	
THE PRENATAL DEVELOPMENT OF FUNCTION	39
The Development of Motor Responses — Principles of Motor Development — Prenatal Sensory Development	
VIEWS OF ORIGINAL NATURE	45
Past Theories of Original Nature — Prenatal Growth and Original Nature	
SELECTED REFERENCES	48
III. THE PRINCIPLES OF LEARNING (<i>by</i> C. R. GARVEY)	49
DEVELOPMENT AND LEARNING	49
The Concepts of Maturation and Learning — Prenatal Learning — Postnatal Maturation — Cephalo-Caudal Sequence — Proximo-Distal Sequence — Differentiation of Specific from General Behavior	
THE CONDITIONED RESPONSE	57
Conditioning — Generalization — Fading versus Retention — Unconditioning — Specialization and Individuation — Differential Conditioning	

CHAPTER	PAGE
OTHER PRINCIPLES OF LEARNING	69
Trial-and-Error Learning — Motivation — Contiguity — Intensity — The Law of Effect — The Law of Exercise — Integration	
SUMMARY	79
SELECTED REFERENCES	80
IV. THE BEHAVIOR OF INFANTS	81
THE SIGNIFICANCE OF INFANCY	81
General Theories of Infant Behavior	
MOTOR BEHAVIOR IN EARLY INFANCY	83
Behavior of the Newborn Infant — Extent of Motor Activity During the First Two Weeks — Early Specific Responses — Coordination of Arms During Early Infancy	
REACTIONS TO SENSORY STIMULATIONS	92
Reactions to Light — Reactions to Sound — Sensitivity to Taste Stimu- lations — Responses to Olfactory Stimuli — Reactions to Temperature — Reactions to Pain Stimulation — Reactions to Tactile Stimulations	
SOME OTHER REACTIONS OF INFANCY	97
Sleep — Smiling and Laughing — Emotional Reactions in Infancy	
DIFFUSE AND SPECIFIC REACTIONS DURING EARLY INFANCY	101
Diffuse Movements Under Specific Sensory Stimulation — The Signifi- cance of Mass Activity	
SELECTED REFERENCES	104
V. GROWTH IN BODILY SIZE	105
SOURCES OF DATA ON BODILY GROWTH	105
Repeated vs. Single Measurements	
GROWTH IN HEIGHT	106
Height of the Newborn — Growth in Height — Growth in Sitting Height	
WEIGHT	110
Weight of the Newborn — Weight from Birth to Twelve Years — Height and Weight Tables	
GROWTH OF THE HEAD, TRUNK, AND EXTREMITIES	118
The Head — The Trunk — The Extremities	
OSSIFICATION AND DENTITION	121
Ossification — Dentition	
THE MUSCULAR SYSTEM	123
THE CIRCULATORY AND RESPIRATORY SYSTEMS	124
The Growth of the Heart and Blood Vessels — Blood Pressure, Heart and Pulse Rates — Breathing Capacity	

CONTENTS

CHAPTER	PAGE
THE NERVOUS SYSTEM	129
Early Growth of the Nervous System — The Growth of the Brain	
GENERAL BODILY GROWTH	132
Types of Growth — Individual Differences in Growth — Circumpuberal Increase in Height and Weight	
SELECTED REFERENCES	138
VI. THE DEVELOPMENT OF PHYSICAL AND MOTOR CAPACITIES	139
MOTOR COORDINATION	139
Muscular Control — From the Simple to the Complex — Sequence in Motor Development	
POSTURE	141
Head Control — Sitting — Standing Alone and with Support	
LOCOMOTION	143
Stages in the Development of Locomotion — Locomotor Responses at Various Ages During Infancy — Movements in the Infant's Walking — Significance of the Age of Walking — Climbing — Running — Jumping — Nature and Learning in Walking	
PREHENSION (GRASPING)	153
Processes Involved in Grasping — The Development of Grasping	
SPEED AND ACCURACY OF VOLUNTARY MOVEMENT	155
Speed of Voluntary Movement — Speed of Fine, Well-Coordinated Movement — Accuracy of Voluntary Movement — Steadiness of Motor Control	
MUSCULAR STRENGTH	162
Measuring Muscular Strength — Strength of Grip and of Upper Back — Variability in Traits — The Ratio of Strength to Height and Weight — Muscular Strength Influenced by Environmental Conditions	
COMPOSITE MOTOR ABILITIES	164
Composite Motor Abilities in Pre-School Children — Complex Motor Abilities of School Children — Other Tests of Motor Abilities	
MUSCULAR FATIGUE	168
NATURE VS. NURTURE IN DEVELOPMENT OF MOTOR CAPACITIES	170
SELECTED REFERENCES	172
VII. LANGUAGE	173
HOW LANGUAGE IS LEARNED	173
Learning to Imitate — Learning the Names of Things — Trial and Error in Verbal Learning	
THE FUNCTIONS OF LANGUAGE	177
Children's Uses of Language — Egocentric and Socialized Speech	

STAGES IN LANGUAGE DEVELOPMENT	179
Early Vocalizations — Language Comprehension — Gesell's Norms for Language Comprehension — The First Word — The Development of Word Meanings — The Word Sentence — The Sentence — Length of Sentences Used — Sentence Structure	
THE GROWTH OF VOCABULARIES	186
Kinds of Vocabulary — Methods of Studying Vocabulary — Size of Vocabulary, <u>Ages One to Twelve</u> — Parts of Speech in Vocabulary — Parts of Speech Used in Conversation	
THE DEVELOPMENT OF READING TO THE AGE OF TWELVE	190
Complexity of the Reading Process — Motor Habits in Reading — Un- derstanding Sentences and Paragraphs — Improvement in Oral Read- ing — Improvement in Silent Reading — Reading Vocabulary, Grades One to Six	
SPEECH DEFECTS	197
Stuttering and Stammering — Handedness and Stuttering	
FACTORS INFLUENCING LINGUISTIC DEVELOPMENT	200
Chronological Age — Physiological Condition and Motor Ability — Sex Differences — Intelligence and Language — Environment	
SELECTED REFERENCES	205

VIII. THE DEVELOPMENT OF MENTAL FUNCTIONS 207

PROBLEMS OF MENTAL GROWTH	207
Curves of Growth and Rates of Growth — Mental Growth During the First Year	
SENSORY AND PERCEPTUAL CAPACITIES	213
Difficulties in Measuring Discrimination — Sensitivity to Pain — Per- ception of Colors — Auditory Discriminations — Discrimination of Weights — Other Senses	
ATTENTION	218
Attention During the First Two Years — Sustained Attention After the First Two Years — Factors Determining Attention	
MEMORY	221
The Infant's Earliest Memories — Memory for Objects, Pictures, and Movements — Immediate Verbal Memory — Logical Memory — Ver- bal Memory with Delayed Recall or Reproduction — The Memories of Children and Adults — The Golden Age for Memory	
JUDGMENT AND REASONING	231
Reasoning Present During Childhood — The Reasoning of Pre-School Children — Children's Reasoning from Six to Twelve Years — Chil- dren's Errors in Reasoning — Detecting Absurdities — Differences Be- tween Children's and Adults' Reasoning	
SELECTED REFERENCES	241

IX. THE GROWTH OF INTELLIGENCE.	242
THE MEANING AND ORGANIZATION OF INTELLIGENCE	242
Definitions of Intelligence — The Organization of Intelligence — Spearman's Two-Factor Theory — Thorndike's Multi-Factor Theory — Abstract, Mechanical, and Social Intelligence	
TERMS USED IN DESCRIBING MENTAL GROWTH	248
Mental Age — Intelligence Quotient or I Q. — Percentile Ranks — Units of Measurement — Absolute Zero	
THE GROWTH OF INTELLIGENCE SHOWN BY THE TESTS USED AT SUCCESSIVE AGE LEVELS	253
Mental Growth as Indicated by the Kuhlmann-Binet and Stanford-Binet Tests — Mental Growth During the First Year as Shown by the Linfert-Hierholzer Tests — Growth Shown by the Merrill-Palmer Scale	
GROWTH CURVES OF INTELLIGENCE	258
Mental Growth Curves During Infancy — Growth Curves for Later Childhood, from Mental Test Norms — Growth Curves from Repeated Tests — Curves from an Age Scale or from Gross Scores Not True Growth Curves — Attempts to Secure True Growth Curves — Conclusions Concerning the Rate of Mental Growth	
CONSISTENCY OF PERFORMANCE ON MENTAL TESTS OR THE CONSTANCY OF THE INTELLIGENCE QUOTIENT	270
The Constancy of the I Q. — Constancy of the Developmental Quotient of Infants and Pre-School Children — Constancy of the I Q. of Elementary School Children — The Significance of the Difference Between Younger and Older Children in Consistency of Development	
RANGE OF INDIVIDUAL DIFFERENCES IN MENTAL TRAITS FROM BIRTH TO TWELVE YEARS	272
NATURE AND NURTURE IN MENTAL GROWTH	274
SELECTED REFERENCES	274
X. EMOTIONAL BEHAVIOR	276
THE NATURE OF EMOTION	276
The Meaning of Emotion — Bodily Changes in Emotion — Neural Basis — Cannon's Emergency Theory	
HOW CHILDREN'S EMOTIONS ARE STUDIED	281
Evidences of Emotions in Infants — Difficulties in Judging Emotions from the Infant's Overt Behavior — Studying the Emotions of Pre-School Children — How to Study the Emotions of School Children	
THE BEGINNINGS OF EMOTIONAL BEHAVIOR	286
The Infant's Earliest Emotional Responses — Are There Any "Primary" Emotions?	

THE DEVELOPMENT OF EMOTIONAL PATTERNS	289
The Differentiation of Emotional Patterns — Maturation in the Development of Emotional Responses — Learning in the Development of Emotional Responses — The Development of Desirable or Undesirable Emotional Patterns	

SELECTED REFERENCES	295
-------------------------------	-----

XI. PROBLEMS OF EMOTIONAL BEHAVIOR AMONG CHILDREN 296

ANGER	296
-----------------	-----

Anger More Common than Other Emotions — Causes of Anger in Children — Children's Overt Behavior During Anger — Temper Tantrums

CHILDREN'S FEARS	302
----------------------------	-----

Causes of Fear Responses in Children — Children's Responses to Fear Stimulations — Individual Differences — Useful and Harmful Effects of Fear — Handling Children's Fears

JEALOUSY	309
--------------------	-----

Early Manifestations and Causes of Jealousy — Jealousy among Pre-School Children — Causes of Jealousy After the Pre-School Years — Expressions of Jealous Behavior among Pre-School and Older Children — Treatment of Jealousy

JOY, PLEASURE, DELIGHT, AND SIMILAR EMOTIONS	314
--	-----

Genesis of Positive Reactions — Causes and Manifestations of Joy, Delight, and Pleasure

AFFECTION	317
---------------------	-----

Causes and Expressions of Affection — Dangers in the Development of Affection

OTHER EMOTIONS OF CHILDREN	319
--------------------------------------	-----

DEVELOPING EMOTIONAL CONTROL IN CHILDREN	319
--	-----

Conditions Favorable to Emotional Control — The Emotional Maturing of Children

SELECTED REFERENCES	323
-------------------------------	-----

XII. MOTIVATION DURING CHILDHOOD 324

MEANING AND IMPORTANCE OF MOTIVES AND DRIVES	325
--	-----

The Practical Importance of Motives and Drives — The Importance of Knowing Children's Motives — Barrenness of Older Views of Instinctive Drives — Drives and Motives

SOURCES OF MOTIVES OR DRIVES	329
--	-----

Physiological Conditions as Sources of Simpler Motives — Other Physiological Conditions as Sources of Drives — Emotion as a Source of Motive

THE DEVELOPMENT OF MOTIVES	336
Native and Acquired Factors in Motivation — The Modification of Motives — Social Motives — Habits, Purposes, and Ideals as Motives	
CHILDREN'S INTERESTS AS MOTIVES	342
The Meaning of Interest — Importance of Interests During Childhood — Relation of Interest to Aptitude and Maturity — Children's Recreational and Social Interests — The Reading Interests of Children — Children's Interests in Motion Pictures — Vocational Interests of Children before Puberty — Laws and Principles for Developing Interests	
SELECTED REFERENCES	358
 XIII. SOCIAL DEVELOPMENT OF CHILDREN	 359
THE SOCIAL RESPONSES OF INFANTS	359
The Learning of Social Behavior — Earliest Social Stimulations and Responses — The Recognition of Facial and Vocal Expressions — Other Social Responses During Infancy — How Infants Respond to the Presence of Other Infants — Varieties of Social Behavior Observed in Infancy	
SOCIAL BEHAVIOR OF PRE-SCHOOL CHILDREN	365
Measuring the Social Development of Pre-School Children: the Bridges Scale — Interpretation of Facial Expressions — Laughter and Crying of the Pre-School Child — The Formation of Friendships During the First Five Years — The Relationship of Language to Social Development — Social Attitudes of Pre-School Children	
SOCIAL DEVELOPMENT AFTER THE PRE-SCHOOL YEARS	373
Social Concepts of Children Six to Twelve Years of Age — Social Contacts and Adjustment of Later Childhood — School Companions and Friendships — Factors in the Formation of Groups	
LEADERSHIP DURING THE FIRST TWELVE YEARS	377
The First Manifestations of Leadership — Changes in Qualities of Leadership with Age	
CHILDREN'S CONFLICTS	379
Conflicts between Individual Children — Conflicts between Groups of Children — The Treatment of Conflicts	
SOCIAL DEVELOPMENT SHOWN BY CHILDREN'S PLAY	383
Individual Play — Group Play	
FACTORS AFFECTING THE CHILD'S SOCIAL DEVELOPMENT	384
Health and Physique — The Family, the Institution — Play and Other Recreational Activities — School Activities — Clubs, Camps, and Gangs — The Social Order	
SELECTED REFERENCES	391

XIV. CHILDREN'S CHARACTER AND CHILDREN'S RELIGION	393
THE MEANING AND NATURE OF MORAL CHARACTER	393
Morality as Conformity or Intent — The Common Good as the Motive of Conduct — The Transition from External to Internal Authority — Character as a System of Inner Forces — Habits, Knowledge, and Ideals as Elements of Character — Ideals or Socialized Motives	
THE MEASUREMENT OF CHARACTER	400
Tests of Conduct — Knowledge and Attitude Tests — Rating Scales	
STAGES IN MORAL DEVELOPMENT	403
Non-Moral, Transition, and Truly Moral Periods — Moral Growth and Levels of Conduct — Individual Differences in Children's Morals	
FACTORS INFLUENCING CHILDREN'S MORALS	407
The Influence of Age on Children's Moral Behavior — Intelligence as a Factor in the Moral Behavior of Children — The Effect of Home and Associates upon Children's Morals — The Effect of School and Church Instruction — Recreational Activities, Clubs, Camps — The Effect of Motion Pictures upon Children's Morals — The Inheritance of Moral Traits — The Guidance of Moral Training	
THE ORIGIN AND DEVELOPMENT OF RELIGIOUS BELIEFS	415
Religious Ideas Acquired, Not Innate — The Nature of Early Religious Beliefs — Religious Development During Childhood — The Value of Religion for Children	
RELIGIOUS EDUCATION OF THE CHILD	419
SELECTED REFERENCES	421
XV. PERSONALITY TRAITS: THEIR MEASUREMENT AND DEVELOPMENT	422
THE MEANING OF PERSONALITY	422
Personality Not an Unanalyzable Entity — Personality as Integrated Drives, Emotions, and Habits	
METHODS OF MEASURING PERSONALITY TRAITS	425
Personality Traits — Methods Having Little Value in Estimating Personality Traits — The More Valuable Methods of Appraising the Child's Personality Traits	
THE PROBLEM OF PERSONALITY TYPES	436
Alleged Types of Personality — Inadequacy of Classification into a Few Types	
THE DEVELOPMENT OF PERSONALITY TRAITS	438
Earliest Personality Differences Observed — Constancy of Early Patterns of Response — Independence, Self-Reliance, Self-Confidence, and Self-Control — Mastery (Self-Assertion or Ascendancy) and Submission — Direct and Indirect Satisfaction of Desires — Introversion and Ex-	

troversion in Children — Happiness and the Feeling of Security — Overlapping of Traits — The Normal Personality	
SELECTED REFERENCES	450
XVI. PERSONALITY ADJUSTMENTS OF CHILDREN	451
THE NATURE OF ADJUSTMENT	451
The Adjustment Process — Thwarting: The Feeling of Inferiority — Thwarting. Conflict of Motives — Defense Mechanisms — Adjust- ment and Personality	
INEFFECTIVE PERSONALITY ADJUSTMENTS	457
Some Maladjustments of Early Childhood — Compensation — Nega- tivism — Rationalization — Daydreaming — Adjusting by Becom- ing Ill — Anxiety and "Nervousness"	
ILLUSTRATIVE BEHAVIOR PROBLEM CASES	468
Violent Temper — Nervousness, with Many Emotional Ups and Downs — Lying — Timid, Afraid, Dependent — Daydreaming	
THE HOME, THE SCHOOL, AND THE CHILD'S PERSONALITY	472
The Parents' Responsibility — The School's Task	
SELECTED REFERENCES	476
XVII. CHILD HYGIENE	477
THE NEED FOR EMPHASIS ON HYGIENE	477
Unsatisfactory Dwellings and Food — Unsatisfactory School Build- ings and Grounds — Malnutrition — Sickness — Mortality — Physi- cal Defects — Bad Mental Habits — Improvement in Recent Years	
THE PHYSICAL WELFARE OF CHILDREN	483
Health Often Neglected by the Home — Factors Affecting the Child's Physical Welfare — Diet and Nutrition — Sleep and Rest — Play and Other Recreational Activities — Sex Hygiene — Hygienic Living Conditions — Correction of Physical Defects and the Prevention and Treatment of Disease — An Ideal Program for the Physical Welfare of Children	
THE MENTAL HYGIENE OF CHILDHOOD	495
The Meaning of Mental Health — The Aims of Mental Hygiene — The Essentials of a Mental Hygiene Program for Children — Mental Hygiene in the Home — A Case of Good Home Conditions — Mental Hygiene in the Nursery School and Kindergarten — Mental Hygiene in the Elementary School — The Church and Mental Hygiene — Other Agencies Contributing to Mental Hygiene	
SELECTED REFERENCES	509
XVIII. THE ORGANIZATION OF TRAITS	511
THE ORGANIZATION OF TRAITS DURING CHILDHOOD	511
Compensation a Popular View — Is Physical Maturity General or	

Specific³ — The Organization of Motor Capacities During Childhood
— The Organization of Mental Abilities — The Integration of Character — The Interrelations of Physical, Mental, Social, Emotional, and Other Traits — Information on the Integration of Personality Traits Meager

PERSONALITY AND LEVELS OF INTELLIGENCE 524

Personality Traits of Intellectually Gifted Children — Personality Traits of Children of Average Mental Ability — Personality Traits of Children Who are Below Average in Mental Ability .

PERSONALITY TRAITS OF DELINQUENT CHILDREN 537

Physical Traits — The Intelligence of Delinquents — Other Traits

SELECTED REFERENCES 538

XIX. THE PREDICTION, GUIDANCE, AND CONTROL OF CHILD BEHAVIOR 539

THE PREDICTION OF CHILD BEHAVIOR 539

Methods of Determining the Predictive Value of Knowledge — The Coefficient of Alienation — Predicting General Tendencies vs. Predicting Individual Differences — Predicting the Child's Physical and Motor Development — Forecasting Intellectual Development — Predicting the Child's Scholastic Achievement in the Elementary School — Predicting the Child's Social Development — Predicting the Moral and Religious Development of Children

THE GUIDANCE AND CONTROL OF CHILDREN 547

The Relationship Between Prediction and Control — General Principles of Child Training

SELECTED REFERENCES 557

ADDITIONAL REFERENCES 559

GLOSSARY 583

INDEX 587

LIST OF ILLUSTRATIONS

FIG.		PAGE
1.	Structure of a Typical Cell	20
2.	Mendelian Heredity	22
3.	Genes in Mendelian Heredity	23
4.	The Back-Cross	23
5.	Sex-Linked Heredity, I	24
6.	Sex-Linked Heredity, II	25
7.	Defect Caused by Different Genes	25
8.	Crossing-Over	26
9.	Early Stages in the Development of the Embryo	31
10.	The Development of the Human Embryo	32
11.	Growth of Fetus in Length	34
12.	Increments of Growth for Each Fetal Month	34
13.	Percentage Growth for Each Fetal Month	35
14.	Percentage Growth for Each Fetal Month	36
15.	Percentage Growth During the Fetal Period	39
16.	Conditioning in Newborn Infants	66
17.	Learning Curves (Time) of Twenty-Five Children, Ages 58 to 71 Months	70
18.	Learning Curves (Errors) of Twenty-Five Children, Ages 58 to 71 Months	71
19.	Improvement in Cutting with Scissors	71
20.	Amount of Practice to Control the Reflex Wink at Various Ages	72
21.	Learning Curves for Substitution of 18 Boys and 20 Girls, Age 12 Years	77
22.	Development of Coordination of Arms in Making a Defense Re- action to Pressure on the Chin, from Birth to 300 Hours	91

FIG.	PAGE
23. Adequacy of Reaction of the Pupil to Light, Infants from Birth to the Age of 30 Hours	92
24. Response of Infants to Sticking with Pin, from Birth to the Age of 80 Hours	96
25. Percentage of Each Twenty-Four Hours Spent in Sleeping and Dozing, from Birth to Age of Twelve Months	97
26. Longest Period of Unbroken Sleep, from Birth to Age of Twelve Months	98
27. Height, at Successive Ages, of a French Boy, Born April 11, 1759 .	107
28. Height from Birth to Twelve Years	107
29. Height of Iowa City White Boys and Girls, Ages Three Months to Fourteen Years	108
30. Annual Percentage Gain in Height	108
31. Growth in Sitting Height from Birth to Twelve Years	109
32. Ratio of Sitting Height to Standing Height from Birth to Twelve Years	110
33. Weight from Birth to Six Years and from Seven to Twelve Years .	111
34. Weight of Iowa City White Boys and Girls, Ages Three Months to Fourteen Years	111
35. Weight of New York Private School Children, Ages One to Eight Years	112
36. Yearly Percentage Gain in Weight	112
37. Weight-Height Index (Metric) from Birth to Six and from Seven to Twelve Years	113
38. Circumference of Head at Various Ages	119
39. Chest Girth at Certain Ages During Childhood	120
40. Ossification Ratios of Carpal Bones, Ages Five to Seventeen Years	121
41. Cattell Dental Age Scale	122
42. Longitudinal and Transverse Diameters of the Heart, Ages Two to Twelve Years	125
43. Systolic Blood Pressure at Various Ages	125
44. Heart Rate and Pulse Rate at Various Ages	126

FIG.	PAGE
45. Breathing Capacity, Ages Seven to Twelve Years	127
46. Vital-Capacity-Height Ratios, Ages Seven to Twelve Years . .	128
47. Vital-Capacity-Weight Ratios, Ages Seven to Twelve Years . .	128
48. Brain Weight at Different Ages	130
49. Monthly Percentage Increase in Volume and Weight of the Cerebellum	131
50. Time Required for Successive Ten Per Cent Increases in Height from Birth to Seventeen Years	133
51. Time Required for Successive Ten Per Cent Increases in Weight from Birth to Eighteen Years	133
52. Height of Girls Maturing at Different Ages	135
53. Weight of Girls Maturing at Different Ages	136
54. Practice Versus Maturation in Stair-Climbing	151
55. Development of Grasping	154
56. Development of Grasping	154
57. Development of Grasping	155
58. Voluntary Motor Ability; Tapping Thirty Seconds	157
59. Rates of Finger-Tapping, Five Seconds, Ages Six to Twelve Years	157
60. Speed of Fine Coordinated Movements	158
61. Motor Development Shown by Scores on Montessori Buttoning Frames	159
62. Speed on Performance Tests	159
63. Increase in Accuracy of Voluntary Movements, Ages Three to Six Years	160
64. Precision of Voluntary Movement	161
65. Strength of Grip, Right Hand	162
66. Strength of Upper Back, Ages Seven to Twelve Years . . .	163
67. Motor Development, Ages Twelve to Thirty-Six Months . . .	166
68. Increase in Motor Ability Shown on the Brace Motor Ability Tests	167
69. Fatigue from Forty-Five Seconds' Tapping	169
70. Development of Language Habits in the Infant	174

FIG.	PAGE
71. Percentage of Children's Responses Which were Comprehensible, Ages Eighteen to Fifty-Four Months	180
72. Average Number of Different Words Used by Children, Ages Eighteen to Fifty-Four Months	183
73. Mean Number of Different Words Used by Children	183
74. Average Number of Words in Children's Responses	185
75. Growth of Vocabulary, Ages Eight Months to Six Years	188
76. Rate of Oral Reading in Grades 1-A to 7-A, on Easy, Medium, and Difficult Paragraphs of the Gray Oral Reading Test	194
77. Errors per Pupil in Grades 1-A to 7-A, on Easy, Medium, and Difficult Paragraphs of the Gray Oral Reading Test	195
78. Improvement in Rate of Silent Reading, Grades II to VII, as Shown by the Norms of Three Reading Tests	195
79. Improvement in Reading Shown by Grade Norms on Thorndike-McCall Silent Reading Tests	195
80. New Words and Total Number of Words in a Series of Readers	196
81. Theoretical Growth Curve, Positive Acceleration	208
82. Theoretical Growth Curve, Zero Acceleration	209
83. Theoretical Growth Curve, Negative Acceleration	209
84. Increase in Rate of Growth	210
85. Constant Rate of Growth	210
86. Decrease in Rate of Growth	210
87. Theoretical Curve of Growth, Positive Acceleration, the Rate Becoming Increasingly Greater	212
88. Increasingly Rapid Rate of Growth	212
89. Pain Threshold, Ages Six to Twelve	215
90. Color Discrimination of Pre-School Children	217
91. Discrimination of Ten Shades of Red, Ages Six to Twelve	217
92. Discrimination of Weight, Ages Six to Twelve	217
93. Error in Estimating an Interval of Two Seconds, Ages Six to Twelve	218
94. Sustained Voluntary Attention	219

LIST OF ILLUSTRATIONS

XXV

FIG.	PAGE
95. Picture Memory, Ages Two to Six Years	224
96. Memory of Movements — Knox Cube Test, Ages Two to Six Years	224
97. Immediate Rote Memory, Concrete Words	225
98. Immediate Rote Memory, Abstract Words	225
99. Development of Memory for Digits	226
100. Memory for Nonsense Syllables, Ages Seven to Eleven Years . .	227
101. Memory for Poetry, Ages Seven to Eleven Years	228
102. Verbal Memory of Pre-School Children	229
103. Development of Reasoning, Ages Seven to Fourteen Years . .	234
104. Scores of English Children on Burt's Absurdities Tests, Ages Eight to Fourteen	239
105. Age Norms on the Linfert-Hierholzer Scale for Measuring the Men- tal Development of Infants During the First Year of Life	259
106. Development of Infants, Ages Fifty-Four to Seventy-Four Weeks	259
107. Development of Infants, Ages Seventy-Eight to One Hundred and Two Weeks	260
108. Mental Growth, Ages One to Thirty-Six Months	260
109. Norms on the Detroit First-Grade Intelligence Tests, Ages Five to Ten	261
110. Norms on the Dearborn Intelligence Tests, Series I, Ages Five to Twelve	261
111. Growth of Intelligence Shown by Norms on Haggerty Tests, Delta I and II	262
112. Growth of Intelligence Shown by Norms on Otis Primary and Ad- vanced Examinations	262
113. Norms on the Pintner Non-Language Tests, Ages Six to Twelve .	263
114. Growth of Intelligence, According to Norms of Pintner-Cunningham Primary Tests	263
115. Mental Growth Shown by Mean Scores on Goodenough Tests for Measurement of Intelligence by Drawings	263
116. Stanford-Binet Mental Ages of Children of Normal and Superior Intelligence, at Chronological Ages Five to Twelve Years . . .	265

FIG.	PAGE
117. Theoretical Growth Curves of Intelligence	266
118. Logarithmic Mental Growth Curve	267
119. Altitude of Intellect from Birth to Twenty Years	268
120. Mental Growth Curve, Absolute Scaling, 4208 Stanford-Binet Scores	268
121. The Approximate Ages of Differentiation of the Various Emotions from Birth to Two Years	291
122. Types of Overt Behavior in Anger Outbursts of Children Ranging in Age from Seven Months to Seven Years Ten Months	301
123. Average Number of Anger Responses per Hour of Observation	301
124. Percentage of Girls at Various Ages Playing with Dolls, Doll Clothes, Doll Carriages, etc.	348
125. Percentage of Town and Rural Children Attending the Movies in One Week	350
126. Percentage of Town and Rural Children Who Climbed Porches, Trees, Fences, etc., in One Week	351
127. Percentage of Town and Rural Children Riding Bicycles in One Week	351
128. Percentage of Town and Rural Boys Playing Marbles in One Week	352
129. Number of Play Activities Engaged in During One Week	352
130. Distribution of Honesty Scores of 789 Children on a Test of Cheat- ing	405
131. Individual Differences in Honesty Shown by Distribution of Cheat- ing Ratios of 2443 Children in Grades Four to Eight	406
132. Percentage of Children Answering that Lies are Never Necessary and Giving Moral and Practical Reasons for Their Answers	407
133. Percentage of Children, Grades 5 to 12, Justifying Lies for Social Reasons	408
134. Scores of Intellectually Gifted and Average Children on Seven Morality Tests	409
135. Degree of Intelligence and Attitudes Toward Law of 801 Iowa Children in Grades 4 to 6	410
136. Developmental Age Scores of Several Hundred Boys, Ages 8 to 15 Years	434

FIG.	PAGE
137. Ability of Children, Ages 8 to 14 Years, to Resist Suggestion .	436
138. Infant Mortality Rates	482
139. Mortality Rates	483
140. Total Calories Needed Daily at Each Age from Birth to Twenty .	486
141. Daily Calorie Requirements of Infants, Ages One to Twelve Months	486
142. Percentage of Urban and Rural Children Under Six Years of Age Who Had Health Examinations, Immunization Against Diphtheria, Vaccination Against Smallpox, and Dental Health Examinations .	492

LIST OF TABLES

TABLE	PAGE
1. Range and Average Number of Trials Necessary to Produce Conditioned Feeding Reactions on Two Successive Trials	60
2. Simple and Differential Conditioning in Four Infants	68
3. The Average Number of Specific Movements per Hundred Plantar Stimulations	89
4. Percentage of Activities of Newborn Infants Which are Specific Reactions to Special Sensory Stimulations	102
5. Weight-Height-Age Table for Boys	114-15
6. Weight-Height-Age Table for Girls	116-17
7. The Effect of the Advent of Puberty on the Growth in Height and Weight of Sixty Girls	137
8. Climbing Efficiency of Identical Twins	150
9. Speed of Voluntary Movement. Mean Number of Taps in Ten Seconds by 32 Kindergarten Children	156
10. Children's Uses of Language. The Classification of 3125 Remarks Made by 27 Kindergarten Children	178
11. Average Size of Children's Vocabularies	187
12. Theoretical Scores and Amounts of Improvement	211
13. Number and Percentage of Outbursts of Anger from Various Causes, in the Case of Forty-Five Children, Ages Seven Months to Seven Years Ten Months	299
14. The Ten Best-Liked Play Activities at Ages Five, Eight, Eleven, and Fourteen	349
15. Responses of Infants to Adults, Observed in Sixty Per Cent or More of the Cases	363
16. Responses of Infants to Other Infants, Observed in Sixty Per Cent or More of the Cases	364
17. Percentage of Children, Ages Three to Fourteen Years, Correctly Judging Emotions from Photographs	368

18. Influence of Home Environment upon Kind of Games Engaged in by Kindergarten Children in Russia	391
19. Estimated Sleep Needs of Children Ages Six to Fourteen	487
20. Mean Correlations Between Certain Physical Traits for Ages Seven to Nine, and Ages Ten to Twelve	513
21. The Intercorrelations of Height and Weight of Girls	514
22. The Correlation of Height and Weight at Intervals of One and Two Years in the Case of Girls, Ages Ten to Fourteen Years	514
23. The Correlation of Height with Height and of Weight with Weight after Intervals of One and Two Years, in the Case of Girls, Ages Ten to Fourteen Years.	515
24. The Organization of Certain Motor Skills	518
25. The Relation of Speed to Accuracy in Arithmetic Computation in Grades Four, Five, and Six	519
26. Intercorrelations of Memory Spans of Pre-School Children, as Measured by Ten Tests	520

CHAPTER 1

PROBLEMS AND METHODS OF CHILD PSYCHOLOGY

I. PROBLEMS OF CHILDHOOD

The Significance of Childhood. An individual's first twelve years are more significant to his ultimate happiness and welfare than is any other interval of his life. The childhood years are learning years, during which the most important patterns of behavior are developed. It has been recognized for many centuries that motor skills, language habits, and knowledge about the world are acquired during childhood. Many such habits, especially those relating to oral language, become increasingly difficult to modify as time passes. Modern research has brought about an even greater realization of childhood's importance by revealing that many other aspects of development, not well understood in the past, depend on learning during the early years. The emotional responses of the individual, which are important modifiers of his traits of character and personality, are largely determined by childhood experiences. Social adjustments throughout life are greatly influenced by the nature of the child's training and by the success or failure of his early reactions to difficulties. These considerations indicate that the scientific study of childhood has great value in relation to the individual's entire life.)

Parallel to the increasing realization of the significance of childhood in the whole scheme of life has been an emphasis on the worth of this period for its own sake. The present century has sometimes been termed "the age of the child" because of its interest in the welfare of the young. Although this tendency may have been sentimental and based on inaccurate conceptions at the outset, it is now clearly recognized that the guidance of children for their own enjoyment, as well as for their ultimate

good, must proceed from reliable information. The child deserves the same consideration that an advanced social philosophy deems desirable for all persons.

The Field of Child Psychology. Child psychology seeks to obtain reliable facts about the nature and development of behavior. By gathering adequate information concerning the nature of children, certain uniformities of development can be discovered that make possible the prediction of the outcomes of various causal circumstances and of various methods of guidance. From this knowledge of the most likely results of courses of action, the control of behavior can be achieved by bringing favorable factors to bear, and by avoiding the more unfavorable ones. (See Chapter XIX.) Many features of child behavior cannot be forecast with any adequate precision at the present time, because accurate information is lacking on many important problems. Much useful knowledge, however, is now available, and further gains may be expected from an extension of the research procedures that thus far have proved effective.

A more specific conception of the field of child psychology may be obtained from an enumeration of its chief problems. The psychology of childhood seeks to systematize information on the origin and beginnings of child behavior, and on the ways in which behavior is modified in the course of development and learning. Because of the important relationships between physique and behavior, the studies of growth in bodily size, of the development of physical, sensory, and motor capacities, and of the hygiene of childhood receive much attention. The child's intellectual, emotional, and social development, his motives and interests, his moral and religious development are examined in considerable detail. An aspect of this field of growing importance concerns the development of the child's traits of personality and his adjustments to his physical and social environments. All of these topics shed light on the primary problems of the prediction, guidance, and control of child behavior.

2. INADEQUATE OLDER METHODS OF STUDYING
CHILDREN

The Importance of Sound Methods. The value of the theories and applications of any subject is dependent on the soundness of the methods by which its primary data are obtained. All sciences have progressed from the crude, approximate, and often positively erroneous methods used in the past toward a greater precision of observation. Throughout the entire field of psychology, there has been an unfortunate tendency to depend on methods long ago discarded by most other sciences. The principal reason for this lag has been the widespread interest in human behavior and the universal opportunity for observing it, which made each man feel competent to judge and to theorize in this field. Many fallacies concerning childhood that are widely believed today are the result of uncritical methods of observing and interpreting behavior. Only by approaching the subject without these traditional prejudices and misconceptions can an effective understanding of the child be gained.

The most common error of method in child psychology, both in the past and the present, is *superficial, uncontrolled observation*. Several more specific unsuitable methods, once widely used in the earlier days of child study, also deserve a passing comment. Prominent among these are *anecdotal biographies*, *reminiscences*, and *questionnaires*.

Superficial, Uncontrolled Observation. Everyone observes child behavior, but few observe it under conditions suitable for scientific purposes. Popular conceptions of the nature of the child are founded largely on superficial observations of children in the home, or on memories of one's own childhood. These are unreliable methods of obtaining data, for a number of pertinent reasons. Common observations are defective because of *inadequate perception* of the facts of behavior. Keen attention is not given to the most important activities, and many significant factors escape notice. Closely allied is the error of *failing to control causes* of behavior. In uncontrolled situations child behavior is the result of many causes, and the really important

ones may not be detected or isolated. Home observations are faulty because they are based on *too few observations* and because *standards of comparison are lacking* between the child observed and other children.

A common error of superficial observation is to note and to remember the *unusual or abnormal* in behavior, ignoring the more frequent occurrences. Of course, careful observations of unique or rare phenomena have a distinct value in promoting an understanding of child behavior, provided that they are made under properly controlled conditions. The mistake is often made, however, of basing generalizations on unusual occurrences and incorrectly applying them to all children.

Ordinary observations also lack precision because the *results are not recorded* at the time that the observations are made. To depend on remembering a complex occurrence, even for a few hours, is unreliable, as a great bulk of psychological experimentation has proved. Persons are likely to report what they think should have happened, often forgetting or ignoring important parts of the actual evidence.

Another serious error is the introduction of *personal bias* into observations. Fond parents are likely to interpret the actions of their children in a favorable light, thus overlooking the truth. Persons who are interested in some theory of childhood easily see only the events that support their preconceptions, ignoring those which are contrary. Usually they do this without any deliberate attempts at deception.

Anecdotal Biographies. For many years much dependence was placed on biographies of children as data for child psychology. Many of the earlier biographies are useful today only as illustrations of all of the faults of superficial, uncontrolled observation. Their more common defects include meager observations, failure to verify the facts observed, and failure to record data at the time of observation. Bias and prejudice were common, since the biographies were most frequently written by parents or others with a special interest in the child, or else by persons desirous of proving the merits of some special theory of training or education. Some of the more recent and

more carefully prepared biographies have distinct value, as is shown presently.

Reminiscences. Accounts of child behavior given from memory a long time after the events have occurred may be interesting or entertaining, but they have little value as a source of reliable information on child behavior. Reminiscences of childhood appear in a number of guises. Some are parental accounts of behavior occurring at a time long past. Others are autobiographical records made at an even later date relative to the real occurrences. In all reminiscences, bias and the tendency to remember the striking, the pleasant, and the favorable are serious handicaps. As someone has said, "We are usually kind to a fault, especially our own." Fiction concerning childhood, some of which has attained great fame for its supposed insight into child nature, is usually based on the author's reminiscences. In all of these sources, a mixture of solid truth with error causes undue dependence to be placed on the account as a whole. Information about children secured through reminiscences sometimes has a limited value. The results need corroboration, however, but not by using other reminiscences as a check, since agreement may be only the coincidence of errors. Facts secured by a faulty method cannot be verified by using the same method, even though different persons employ it.

Questionnaires. During the early days of the Child Study Movement (thirty or forty years ago) questionnaires of various kinds were widely used, especially by G. Stanley Hall and his students. Recognizing the need for more adequate information on child behavior, they believed that they had found a ready way to secure masses of data by asking questions of children and adults. Some *questionnaires of direct facts* gave information of value and were the forerunners of today's tests and experimental techniques. Thus, teachers asked questions orally of young children, and used supplementary questions whenever the child's answers indicated the need for it. If the question, "Have you seen a sheep?" was answered in the affirmative, it was followed by such questions as, "How large was it?" and

"When and where did you see it?" Later, questionnaires were printed, with spaces provided for writing the answers.¹ Questionnaires of this direct sort were of some merit, but they often suffered from the failure to secure answers from a sufficiently large or representative group, and from errors in the interpretation of the results.

Far less reliable were *questionnaires of reminiscence and opinion*, sent chiefly to adults, which were also widely used. These suffered from all of the errors of inadequate method. They seemed to be based on the assumption that faulty observation could be corrected by the bulk of great numbers. Thorndike's classic criticism of this type of questionnaire,² first made when the technique was widely used, is still pertinent today. "... The ignorance of a thousand people is no better than that of one; truth cannot be manufactured from constant errors by getting a great number of them."³

3. UNRELIABLE THEORIES OF CHILD NATURE

How Fallacious Theories Arise. Early in the history of human thought, we find man formulating theories which seem to make his world of experience more coherent and intelligible. Since man has long been interested in the education and training of children, theories of child nature have been formulated by many. Most of the broader theories are unsound and unreliable. Their lack of merit has been caused principally by two factors. One shortcoming has been dependence on superficial observation and unreliable methods of obtaining data, as described in the last section. The other chief cause of error is the use of *uncritical speculation*. Many conceptions of childhood have been based on adult philosophies, qualities being

¹ For Hall's classic article, "The Contents of Children's Minds," see *Pedagogical Seminary*, vol. 1, pp. 139-173. The early volumes of this periodical contain reports of many questionnaire studies.

² *Educational Psychology*, vol. 1, 1913, p. 32.

³ See page 13 for a discussion of Directed Observation in which a check list or observation schedule prepared in advance is used while making observations, thus supplanting *questionnaires of reminiscence and opinion*.

ascribed to the child to make him fit into some larger system of thinking. Often this was done with an almost complete disregard for actual observations. The satisfying quality of a coherent theory was such as to cause its supporters to gloss over its improbabilities and to be blind to contradictory facts.

Many fallacies concerning childhood that persist in popular thinking even today are based on theories long since discredited. At the risk of digging up old ghosts, it is perhaps worthwhile to describe a few of the more common fallacious theories of child nature. The reader is warned that these are without any great merit. Only by approaching the subject without these traditional preconceptions can an effective understanding of the child be gained.

Some Early Theories. One theory of child nature, resulting from a purely speculative approach (and still widely believed), regarded the child as *inherently sinful*. In a past age dominated by gloomy theological conceptions, the dogma of the original sinful state of man easily became twisted into a notion of the innate waywardness of the child. While modified from its earlier theological connotations, the assertions that children are naturally mischievous, that stern discipline is of general benefit, and that "boys will be boys," reflect essentially the same basic attitude. The doctrine of childhood's badness also offers a plausible rationalization to parents who refuse to accept responsibility for the guidance of a child's conduct.

Disbelieving the widely accepted doctrine of sinfulness, Rousseau⁴ advanced the theory that child nature was essentially *good and pure*, until spoiled by contact with adult society. This doctrine was based, not so much on observation, as on agreement with a preconceived general philosophy concerning democracy and the worthwhile character of mankind. Many persons since Rousseau's time have proposed that education should be entirely governed by the child's natural tendencies, because of their essential goodness. In a certain sense, this theory has been a useful antidote to the much worse preceding one, but it often has led to sentimentally motivated excesses, and it is not based on sound methods of observation.

⁴ *Emslie, A Treatise on Education.*

Other early theories that were derived from speculation are numerous. John Locke's theory of the child's mind as a *tabula rasa* or blank page, until impressed by experiences, was made to fit his philosophical system and was not a result of systematic observations. Another implicit view regards the child as an *adult in miniature*, but it is not borne out by the facts.

The Recapitulation Theory. No erroneous theory concerning childhood has appealed to a wider audience than the doctrine of recapitulation. Because of its comparative recency and because of the existence of a few mistaken advocates even-today, it is a particularly important cobweb to clear from the reader's mind.

The theory of recapitulation held, in general, that "ontogeny recapitulates phylogeny"; that the child in its development repeats, in abbreviated form, the history of the race. The theory includes two chief propositions, one or both of which have been advocated by various proponents.⁵ First, that the human embryo passes through the same stages as did the race in its evolution from simpler forms of life. Second, that the child in its development repeats human history, from the barbaric to the civilized stages. This latter has been termed the "culture-epochs" theory, and school curricula have sometimes been based on it.

The recent opinions of embryologists, who are most competent to speak, are definitely opposed to the first proposition. Except for the very general fact that the embryo develops from simple to complex, as did the race, and shows certain other resemblances, there is little basis for it. As Lewis⁶ points out, the embryo possesses a brain unduly large for its skull and for the rest of the body. Exactly the opposite was true of our remote animal ancestors. The whole structure of the embryo is as characteristically human in all stages as are the adult body and its organs.

⁵ For an extended argument for the theory, see Hall, *Adolescence*, vol. 1, chaps. 1 and 2. For an able refutation, see Thorndike, *Educational Psychology*, vol. 1, chaps. 16 and 17, or *Educational Psychology (Briefer Course)*, chap. 8.

⁶ *Contributions to Embryology*, vol. 9, no. 39, pp. 301-302. Cf. also Keith, *Human Embryology and Morphology*, pp. 35 ff.

The second parallelism between the behavior of the child and the development of the species has never been better reduced to its essential absurdity than by Thorndike's quotations from Hall on the "fish stage," and by his comments on the selections. Said Hall:⁷

A babe a few days old made peculiar paddling or swimming movements....

In children and adults... we find swaying from side to side or forward and backward, not infrequent. This suggests the slow oscillatory movements used by fish....

Children... after the first shock and fright, take the greatest delight in water....

Others older and less active can sit by the hour seeing and hearing the movement of water in sea or stream.

Thorndike's⁸ comment is:

The fish stage is thus paralleled all the way from four days to forty years, even if we doubt the existence in fishes of anything like the elderly contemplation of water by one sitting on the bank.

This theory, as stated by its over-enthusiastic, non-biologically trained proponents, has no significance for the problems of predicting and controlling the behavior of children and adolescents. Knowledge adequate to these tasks is best sought, not by the application of dubious parallels, but by careful, extended, and quantitative observations of the actual subject matter — the behavior of children. A vastly greater knowledge of boys and girls may be obtained by studying their interests, impulses, and habits, than by reading the fullest possible account of the racial past or of histories of civilization.

Other Speculative Theories. A number of other speculative theories have attempted to cope with the problem of the relationship between individual and racial development, but without spectacular success. Thorndike's⁹ *utility theory* states that variation and selection account for both types of development, the behavior more useful in assisting the individual to cope

⁷ *Adolescence*, vol. 2, pp. 192-195. New York, D. Appleton & Co., 1904. Quoted by special arrangement with the publishers.

⁸ *Op. cit.*, vol. 1, pp. 256-257. Cf. also Norsworthy and Whitley, *Psychology of Childhood*. (1st edition), p. 37.

⁹ *Op. cit.*, vol. 1, chap. 16.

with his environment being selected. Hollingworth¹⁰ advances the related view that the individual develops as he does, not *because* of the race's development, but "*for the same reason*, namely, because of the limitations of skill, intelligence, and knowledge." Koffka¹¹ supports a cautious *correspondence theory*, that both individual and race develop from more primitive to more highly developed forms of reaction.

The theory of *catharsis*,¹² which relates, strangely enough, both to the theory of the child's sinfulness and to that of his goodness, deserves little support. It holds that early wrongdoing is useful in immunizing the child against later wrongdoing. The "baser instincts" were supposed to be worked out of the system during childhood, to the good of later life.

All of the speculative theories described in this section may be regarded as examples of an inadequate approach to child behavior. Only by discarding preconceptions and armchair methods, and by observing the child in the same manner as the scientist observes any other event in nature, can effective progress in child psychology be made.

4. THE SCIENTIFIC APPROACH TO CHILD PSYCHOLOGY

Scientific Method. The extension and improvement of child psychology in recent years are caused chiefly by the use of scientific methods in this field. The conditions of science in general include the employment of more precise methods of *observation* and the interpretation of the data by the inductive method of *generalization*. These processes result in the accumulation of a body of scientific *knowledge* which enables the prediction and control of natural events.

An essential of scientific observation is that facts shall be accumulated in a *systematic* manner, according to a planned mode of attack. The methods used should be subject to *verification* by other observers. This necessitates an exact description of the conditions of observation, so that others can repeat

¹⁰ *Mental Growth and Decline*, p. 213.

¹¹ *The Growth of the Mind*, p. 47.

¹² Hall, *Adolescence*, vol. 2, pp. x, 83. Burk, in *Pedagogical Seminary*, vol. 6, p. 24.

them under similar or definitely varied conditions, record their findings, and make valid comparisons with the original results. The methods of science are *precise*, using carefully defined descriptive terms, or quantitative results often obtained by the use of instruments and apparatus. Scientific observations must be made under *controlled conditions*, so that all of the principal influences affecting the results are known and measured, and so that disturbing factors are eliminated.

From the data obtained by scientific observation, conclusions may be drawn by the use of the inductive method of generalization. First, a wide range of data is systematically tabulated, making it possible to detect orderly sequences and uniform occurrences. Second, an hypothesis is formed to account for the results and to include a number of observations in a common category. Third, this hypothesis is checked or tested by further observation and experimentation, leading to its rejection or to its more definite acceptance. Generalizations obtained in this manner furnish a more secure basis for a unified conception of natural phenomena than do the speculative methods condemned in the preceding section.

When observations have been made with the proper precautions and have been subjected to critical scientific thinking, they emerge as the body of scientific knowledge of their designated field. Scientific knowledge at any one time represents the solutions of problems for which effective methods have been found. This body of established facts is constantly being revised in the light of new research and is extended from time to time as new methods overcome older difficulties. Science is therefore continually in a state of flux, its essential characteristics being change and progress. Tomorrow's science may differ from yesterday's, not because the earlier generalizations were untrue, but because the later ones are truer. Any scientific treatise is necessarily a compendium of the present status of a subject that will change as new areas of research are developed.¹³

¹³ For a discussion of science in general, see Pearson, *A Grammar of Science*; for the development of methods in psychology, Boring, *A History of Experimental Psychology*. The methods more specific to child psychology are described by Anderson, chap. 1, in *Handbook of Child Psychology* (2d edition, revised), edited by Murchison.

It would be impossible to describe in detail all of the methods of scientific observation that have contributed to child psychology. A selected number of the most significant types of research include: *systematic biographies*, *case studies*, *directed observations*, *measurement*, *statistical methods*, and *experimentation*. The principal features of these are described in the paragraphs following.

Systematic Biographies. The beginnings of scientific method in child psychology are found in some of the more systematic of the early biographical accounts of the mental and physical development of children. Shortly before 1800, Tiedemann¹⁴ published in Germany his "Observations on the Development of the Mental Faculties of Children." In 1882 a German physiologist, Preyer, published his influential *Die Seele des Kindes* (The Mind of the Child), giving detailed observations of the development of his son from birth to the age of three years. This work is still an example of scientific effort in biography. Extensive notes were taken at the very time the observations were made, and from them the biography was later written. The topics treated, including such observations as the reflexes present at birth, the appearance of the first reaction to light, and the course of the grasping reaction, show the difference between this biography and non-scientific anecdotal accounts. Writings such as Preyer's foreshadowed the later use of directed observation and experimental techniques. During the two or three decades following, several other adequate biographies of infants were published.¹⁵

Observations made by intelligent parents and others today may be of psychological value, if systematic and unbiased procedures are followed.¹⁶ Biographies in general, however, suffer

¹⁴ For a translation of this monograph, see Murchison and Langer, *Journal of Genetic Psychology*, vol. 34, pp. 205-230.

¹⁵ See, for example, Perez, *Les Trois Premières Années de l'Enfant*; Shunn, *Biography of a Baby*; Dearborn, *Moto-Sensory Development*; Stern, *Die Kindersprache*; Moore, *The Mental Development of a Child*; Hall, *The First 500 Days of a Child's Life*, and such specialized studies of early language development as those by Beyer, in *Educational Review*, vol. 49, pp. 191-203; Brandenburg, in *Pedagogical Seminary*, vol. 22, pp. 89-120; and Nice, in *Pedagogical Seminary*, vol. 24, pp. 204-243.

¹⁶ See, for example, the carefully arranged schedules in Anderson and Goodenough,

from the inevitable handicaps of poor control of the situations studied and of the observation of too few instances. They are of greater value in suggesting problems for study than for settling issues with any finality.

Case Studies. Closely allied to the biographical method is that of making detailed studies of selected children over a limited period of time. Normal children may be studied in this manner, but a larger number of children who present difficulties in development, learning, or conduct have been subjected to this approach. A careful case study includes an account of the child's family and social environment, his physical condition and history, his development, his educational and economic experiences, and his present habits, adjustments, and satisfactions. Case studies are usually made by well-trained educational, social, or psychological workers who have an impartial and objective point of view. They gather data from existing records, from the child's own story, and from his parents, teachers, and other associates. Exact observations and measurement techniques usually supplement these reports.

As a method of approach to the problems of a particular child, the case study method is irreplaceable. As a method of scientific research, its results must be viewed with caution. Only when the studies of large numbers of children are carefully compared to discover uniformities, deviations, and cause and effect relationships, can trustworthy conclusions be drawn.¹⁷

Directed Observation. When observations of the child's responses to certain naturally occurring events are made according to a prearranged schedule, the technique may be termed directed or systematic observation. Situations are selected that occur repeatedly under normal conditions, and the behavior of children of various ages and with various kinds of previous experience is carefully recorded. A prepared schedule or outline for making observations is used, so that the trait may be noted uniformly and so that attention will be

¹⁷ For an illustration of the case study method, see Woolley, *Pedagogical Seminary*, vol. 32, pp. 569-598.

directed in a systematic manner. Because of the freedom of this technique, it is the most useful one for investigating the spontaneous behavior of children.

Many excellent examples of systematic observation may be cited. Piaget studied the development of children's language, judgment, and reasoning by recording observations as they were made, according to a predetermined plan. Thomas applied the method to problems such as that of children's social relationships. McCarthy and others have investigated vocabulary and language usage by this technique. Gesell has been one of the most important contributors, often using motion picture records to preserve evidences of behavior for detailed analysis, and to compare the responses of the same child at various ages.¹⁸

A modification of the observational method is to note the occurrence of a particular type of behavior during selected periods of time, known as the technique of *time sampling*. By the use of this method it is possible to determine the reliability of a limited observation, and hence by the use of appropriate statistical techniques to know what length of observation must be employed in order to secure results that accurately characterize the child.¹⁹

It is but a short step from such careful observations of naturally occurring behavior to the experimental methods in which conditions are artificially controlled and modified to discover the resultant change in response.

Measurement. The method of measurement is employed by making quantitative observations of children's responses to certain tasks presented under standard conditions. Measurement is one of the most widely applicable methods, being included in most of the other techniques here described. Physical measurement was one of the earliest developments in the

¹⁸ The studies mentioned are reported in: Piaget, *The Language and Thought of the Child*, *The Judgment and Reasoning of the Child*, and *The Child's Conception of the World*; Thomas, *Some New Techniques for Studying Social Behavior*; McCarthy, *The Language Development of the Preschool Child*; and Gesell, *Infancy and Human Growth*.

¹⁹ See Olson, *The Measurement of Nervous Habits in Normal Children*; Goodenough, *Journal of Juvenile Research*, vol. 12, pp. 230-235.

field. Height, weight, the dimensions of various parts of the body, various aspects of muscular strength, and other features of motor response have been measured with instruments of considerable precision. Measurement has also been successfully applied for many years in the investigation of relatively simple psychological functions, such as rate of tapping, memory for diverse sorts of materials, reaction time, and various types of sensory discrimination.

More complex functions, such as intelligence and honesty, have been measured with moderate success only in recent years. Following the pioneer work of the French psychologist, Alfred Binet,²⁰ the measurement of intellectual characteristics advanced with great strides. In this country, Edward L. Thorndike and Lewis M. Terman have been especially influential among the large number of persons engaged in the development of mental tests. Psychological testing has become a complex technology which is concerned constantly with the improvement of the reliability and validity of the various types of measurements employed.

In investigating still more complex traits of personality and character for which exact measures have not been devised, methods of *rating* are used. Ratings supply a means for making the observation and judgment of traits quantitative, but are to be regarded only as stop-gaps pending the invention of more refined methods.²¹

Statistical Methods. The development of measurements in child psychology has coincided with the invention of appropriate mathematical methods for manipulating the data obtained so as to make their meaning clearer. Without the aid of statistical techniques, the crude results of measurement would be difficult to interpret appropriately. Some problems that are attacked by statistical methods include the determination of the relationship between two sets of measures, the

²⁰ Binet and Simon, *Année psychologique*, vol. 2, pp. 191-244.

²¹ Hollingworth, *Judging Human Character*; Hartshorne and May, *Studies in Deceit*; Webb, *British Journal of Psychology, Monograph Supplement No. 3*, 1915. See also references in Chapter XV.

significance of a difference discovered between two groups, and the degree to which a measure can be depended upon to produce the same results when applied more than once. Statistical methods do not furnish an independent means of obtaining facts, but are the chief tool for manipulating and interpreting the results of testing, directed observation, rating, and experiment. Many examples of the value of statistical devices are given throughout this volume.

Experiment. An experiment is a special kind of observation made under controlled conditions. The situations are set by the experimenter without waiting for them to arise in the child's natural environment, and the responses are noted or measured. In the ideal conception of an experiment, all factors or conditions that might affect the result are held constant except one, which is varied deliberately. Under this arrangement, any variation in responses can be ascribed to the operation of the variable factor which is now regarded as causal. Of course, it is possible only to approximate this ideal in many problems of child psychology. All of the factors that might influence the result are not always known, and only the factors that are suspected to have the greatest effect on the outcomes are controlled. Because of this fact, experiments vary widely in merit and conclusiveness.

A simple example of an experiment will make the concept of control clearer. If we are investigating the relative honesty of boys and girls in a certain situation, many other variables must be excluded. If the boy and girl groups are of the same age, of the same race, of the same intelligence, from the same kinds of homes, and have had essentially the same school and other out-of-school experiences, then these factors are removed from consideration as causes. Any difference now found between the groups can be considered as caused by sex alone and not by differences in age, race, education, intelligence, or social status. Even with these precautions care must be taken to avoid the influence of still other factors upon the results.

A common type of experiment is carried out by selecting two carefully matched groups of children, and subjecting one (the

“experimental”) group to some definite procedure which is withheld from the other (the “control”) group. The influence of the specific procedure being investigated is inferred from the resulting difference between the groups, since they are alike in all except the critical factor.

Experimentation and exact observation also are facilitated by the use of instruments and apparatus for controlling the situation and for recording responses. Photographic records are frequently used. Adult observers watch children's reactions through one-way vision screens that enable them to watch the child while he is unaware of his being observed. A vast inventory of standardized materials is used to provide the situations presented to children, while mechanical instruments may record his responses with great precision.

Progress in Methods. The ultimate goal of method in child psychology is the extension of valid experimentation. Although its subject matter makes experimental control more difficult than in most other fields of science, new problems are being brought within the realm of exact study every year. The child psychology of the present is a compilation of the results achieved in approximately fifty years of progressively refined research. The child psychology of the future will include an extension of knowledge into areas now inadequately investigated.

SELECTED REFERENCES

Anderson gives an excellent account of “The Methods of Child Psychology” in chapter 1, *Handbook of Child Psychology* (revised edition, edited by Murchison), Anderson and Goodenough give carefully arranged schedules for observation of children's behavior by parents or others in *The Modern Baby Book*, Bridges, in the *Social and Emotional Development of the Pre-School Child*, chaps. 1-3, describes the methods used to study the emotional and social reactions of pre-school children in the nursery school at McGill University; Gesell, in *The Mental Growth of the Pre-School Child*, chaps. 4-6, describes in detail the methods used at the Yale Child Development Clinic for studying infants and pre-school children, McCarthy, in *The Language Development of the Preschool Child*, chap. 2, and Piaget, in *The Language and Thought of the Child*, chap. 1, give data on methods of investigating language development; Richards and Irwin, in *Psychological Bulletin*, vol. 31 (1934), pp. 23-46,

present an excellent résumé of "Experimental Methods Used in Studies on Infant Reactions Since 1900"; Stoddard and Wellman, *Child Psychology*, chaps. 1 and 2, also give an excellent critical discussion of methods used in research on the problems of child psychology; Thomas and associates, in *Some New Techniques for Studying Social Behavior*, present a useful and detailed discussion of methods applicable for investigating the social behavior of children.

The major problems of child psychology are discussed in the foregoing references in connection with the descriptions of methods. Additional references are given at the end of this volume.

CHAPTER II

THE ORIGINS OF CHILD BEHAVIOR

THE development of the child does not begin at birth. When he is born, the infant is already a highly organized individual, capable of a considerable number of elaborate activities. The behavior of the newborn is the result of an orderly process of growth in which the original germinal material develops, becomes differentiated, and is modified. To achieve a thorough understanding of a child's behavior, it is necessary to trace the development of his characteristics from their origins in the prenatal period.

An account of the origins of child behavior must begin with a description of the nature and variations of the germ cells by which the child is related to his ancestry. Many aspects of individual development can be understood only in relation to heredity. From this beginning, [the course of individual prenatal growth must be traced through the stages of fertilization, embryonic development, and fetal growth to birth.] A large amount of reliable information has long been available concerning the prenatal growth of the structure of the individual. Recently, much interest has been given to the prenatal development of function and behavior. This last approach endeavors to trace the reactions of the individual, as well as his form, from their real beginning.

The observational attack on the early development of behavior promises to throw considerable light on an age-old psychological problem, that of "the original nature of man." Some speculative writers on this topic seem to have assumed that the innate characteristics of man spring into existence miraculously and without pre-existing cause. Traits that were manifested later in life were often erroneously thought of as "inherent" or "potential" in the less mature organism in which they had not yet appeared. Abandoning these concep-

tions, scientists have sought instead to describe the precise course of behavior from its very beginning. By careful observation of the time of the appearance and of the nature of the development of structures and functions, more truth can be ascertained than by any amount of theorizing about supposedly ultimate origins.

I. HEREDITY

Germ Cells. The characteristics of an organism are determined jointly by the material from which it is formed and by the conditions under which it develops. Although psychology is concerned primarily with the facts of individual develop-

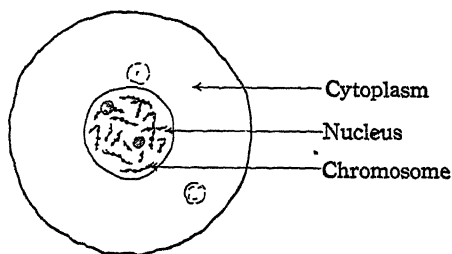


FIG. 1. STRUCTURE OF A TYPICAL CELL

Cells have a great diversity of shapes, but all have *cytoplasm*, a *nucleus*, and *chromosomes*.

ment, the importance of the original material must not be ignored. In all species that reproduce bisexually, including man, the individual begins his existence as a single cell, the fertilized germ cell. This is formed by the union of two original germ cells, one from each parent. The structure of a typical cell may be seen in Figure 1. The external ring is the *cytoplasm*, a mass of relatively undifferentiated protoplasmic material. Within is the more differentiated *nucleus*, which contains long threadlike bodies, the *chromosomes*, which are of special interest in the study of heredity. Each chromosome consists of a linear string of exceedingly minute particles, the *genes*, which are believed to be the principal carriers of hereditary traits. The

existence of the genes was at first inferred from the operation of heredity, but they have since been observed directly.²

In the fertilized germ cell and in all of the body cells that are derived from it during the course of development, the chromosomes occur in pairs. Each gene of a chromosome is paired with a corresponding gene in the adjacent chromosome. In the human species, there are twenty-four such pairs of chromosomes. One chromosome of each pair comes from the maternal germ cell and one from the paternal. Each of the separate parental germ cells, therefore, contains half of the normal number of chromosomes and each supplies, in a sense, half of the heredity of the offspring.

In both parents, the germ cells develop in the reproductive glands, dividing from existing cells by the usual process of cell division, or mitosis. Just before the final stage of development of a germ cell, a peculiar type of division occurs, in which half of the chromosomes go to one of the resultant cells, and half to the other. One further division then takes place, the one complete germ cell producing four cells, each with half of the usual number of chromosomes. In the maternal production of germ cells, only one of these four, the *ovum*, remains large and capable of subsequent development. The other three smaller cells of the last division are the *polar bodies*, which are not functional. In the paternal germ cell division, however, all four of the cells develop into *spermatozoa*, each capable of fertilizing an ovum.

The ovum and spermatozoan differ considerably in the less essential aspects of structure. The ovum is large as compared to other body cells, while the sperm is among the smallest. The ovum is round and inactive; the sperm elongated and extremely motile. The ovum carries a large bulk of cytoplasm and some yolk which assists in nourishing the embryo, but the sperm has a minimum of cytoplasm. Each, however, contains the twenty-four single chromosomes, which are of the greatest importance in determining the course of development.

² Morgan, *The Theory of the Gene*, Bridges, in *Science*, vol. 83, pp. 210-211; Jennings, *The Biological Basis of Human Nature*.

In the process of fertilization the maternal and paternal chromosomes join to form the normal paired arrangement. The characteristics of the individual are determined by the combined effects of these paired chromosomes. The two sets of

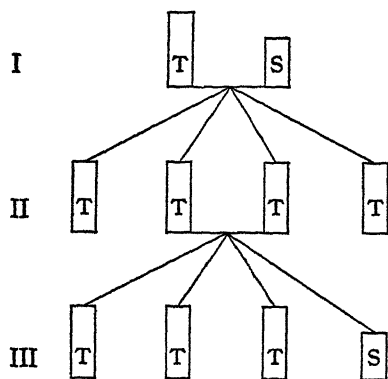


FIG. 2. MENDELIAN HEREDITY

When the tall and short varieties of peas were crossed, the offspring (II) were all tall. In generation III, the 3 to 1 ratio occurs.

determiners, however, interact in a number of complex ways. The manner in which the genes operate in influencing the traits of the individual constitutes the laws of heredity.

Mendelian Heredity. The simplest principles upon which the modern study of heredity is based were discovered in 1866 by Gregor Johann Mendel, a monk at Br \ddot{u} nn, now in Czechoslovakia. Experimenting with cross-pollinated lines of plants, Mendel noted that if two varieties of peas that were characteristically

tall and short were crossed, the offspring (generation II) were all tall. Upon propagating these, the plants of generation III appeared in the now famous Mendelian ratio of three tall to one short. These facts are indicated in Figure 2. Since the tall characteristic is the only one to appear in generation II, and is in the majority in generation III, it is termed *dominant*, while the short trait is *recessive*.

Modern genetics explains the Mendelian type of inheritance by the concept of paired genes, as shown in Figure 3. Let us suppose that the second gene from the top, as represented in the figure, is the determiner for tallness, indicated by its blackness. The white gene indicates the absence of the tall characteristic, or the determiner for shortness. In generation II, each offspring, receiving one chromosome of the pair from each parent, has a paired dominant and recessive; hence the dominant trait appears. The chromosome pair containing two dominant

determiners is known as *duplex* with respect to this trait, that containing one as *simplex*, and that containing none as *nullplex*. In generation III, the four possible combinations of paternal and maternal contributions give one duplex, two simplex, and one nullplex. Only in the last does the recessive trait appear overtly, hence the three to one ratio.

The so-called Mendelian ratio does not cover all cases, however. One common observation that is widely used in the experimental work of geneticists is the *back-cross*, made by mating a simplex and a nullplex. As Figure 4 shows, this results in a two to two ratio of the dominant and recessive characteristics.

An observation of practical importance may be made from even these very simple genetic studies. It is sometimes said that heredity means "resemblance to parents." This is an in-

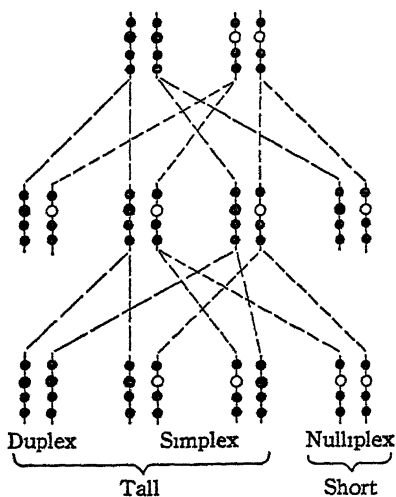


FIG 3 GENES IN MENDELIAN HEREDITY

The recessive characteristic appears only in the individuals who are nullplex, — i.e., have the defective gene in both chromosomes.

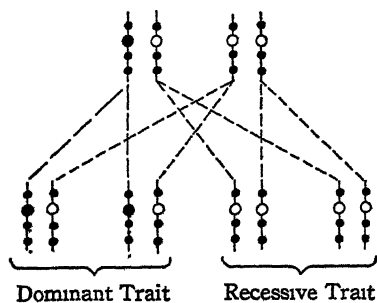


FIG. 4. THE BACK-CROSS

The mating of a simplex and a nullplex gives two simplex and two nullplex.

exact and often misleading statement. Thus in the type of heredity shown in Figure 3, generation II resembles one parent but not the other, while one fourth of the offspring of generation III resemble neither parent! In the back-cross (Fig. 4), half of the offspring resemble one parent and half are like the other. It is clear that the traits of offspring

cannot be predicted from observations of the parents alone, but only from a knowledge of the germ cells of the parents. In some plants and lower animals this can often be determined by tracing the variations in offspring through many generations. With the human species it is impossible in most instances to have adequate knowledge of the germ cells for practical prediction.

Other Principles of Heredity. A number of observations concerning heredity do not conform to simple Mendelian principles. One of the best studied of these exceptions is *sex-linked inheritance*. In a female germ cell two chromosomes exist, known as the x chromosomes, which behave according to ordinary principles. The corresponding pair in the male is an x chromosome and a y chromosome, the y chromosome showing a singular ineffectiveness as a determiner of traits. Hence a single recessive defect in the x chromosome of the male may cause the undesirable trait to appear, since it is not paired with a normal dominant. In Figure 5, the principal features of sex-linked inheritance are indicated. A defect in the male of generation I does not appear in generation II, and the descendants of his

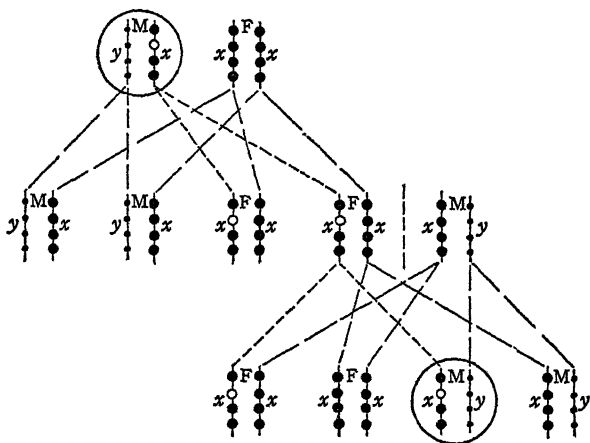


FIG. 5. SEX-LINKED HEREDITY, I

The trait appears in the male of generation I, disappears in generation II, and affects half the males in generation III. *M*, male; *F*, female; x and y chromosomes are so

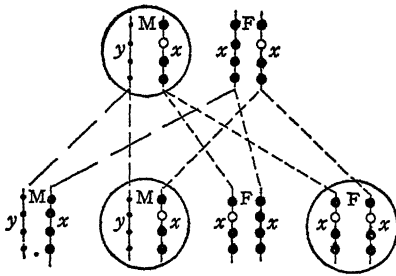


FIG 6.

SEX-LINKED HEREDITY, II

If an affected male and a female carrying the recessive gene are mated, half of the daughters as well as half of the sons will show the characteristic.

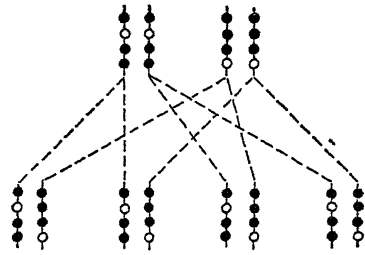


FIG. 7. DEFECT CAUSED BY DIFFERENT GENES

Both parents have defects which are shown by none of the offspring. Since the same trait may be due to different genes, the parents may even have the same trait.

sons are free from it. But the daughters in generation II are "carriers" of the trait, and if paired with normal males will transmit it to half their sons. As Figure 6 indicates, the sex-linked trait can appear in females if both parents possess determiners for it. Among human characteristics, red-green colorblindness and hemophilia, a tendency to excessive bleeding, show some signs of sex-linked heredity. They are consequently much more prevalent in males than in females.

Another complication in genetics arises from the fact that the same defect may be caused by different genes. In Figure 7, the paternal parent has a defect because of defective genes in the second pair. The same defect may occur in the maternal parent due to another defective pair, represented as the fourth. Since the defective genes do not coincide in any of the offspring, none of them will show the defective trait overtly. This element in heredity is the basis of the common belief that the union of closely related persons will result in defective offspring, which is not always true. Related persons have rather similar germ cell organization, and any defect that is present is likely to be due to the same genes. Unrelated persons, who have a greater chance of having their defects in different genes, are less likely to transmit them to their offspring. Excellences as well as defects are due to genes, however, and inbreeding may

result in the emphasis of good traits as well as of undesirable ones.

Still another factor that renders predictions by heredity more hazardous is the phenomenon of *crossing-over*. A pair of chromosomes sometimes becomes twisted, and then interchanges genes, as pictured in Figure 8. When each of these separate chromosomes subsequently combines with those of the other parent, new combinations of hereditary possibilities become established. At first, crossing-over perplexed biologists, for it resulted in strange non-Mendelian ratios of trait occurrence among offspring. Later, it became the basis for the discovery of the relative positions of genes in the chromosomes, for adjacent genes cross over together more frequently than do remote ones. Crossing-over follows orderly principles, and can be expected in definite percentages of cases in certain insects that have been investigated exhaustively.

Blended Inheritance. Much of the simpler research in heredity ignores quantitative differences in the degree of existence of various traits. Characteristics are discussed as though they were either present or absent, which is a sufficiently close approximation of the truth in many instances. Other and, on the whole, more important traits appear in a uniform gradation. These include skin color, height, and practically all mental traits, such as intelligence. Blended or continuous traits can be explained by principles of heredity which require only a little extension of the laws so far described.

A relatively simple example of a blended trait occurs in a cer-

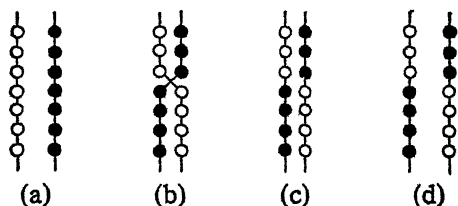


FIG. 8. CROSSING-OVER

The normal chromosomes (a) overlap and come together (b). In (c) and (d) the two lines of genes on each side are represented as having joined, making a new combination.

tain variety of wheat. If a brown-grained type is crossed with a white-grained, five degrees of color from dark brown to white appear in generation III, in the ratio 1:4:6:4:1. This can be explained on the assumption that two pairs of genes cooperate in producing the effect, the darker color resulting from a larger number of positive determiners. If the two positive genes are A and A' , and their respective absences are a and a' , then each parent can contribute four varieties of determiners: AA' , Aa' , aA' , and aa' . There are sixteen possible combinations of these when paired, as follows:

	$\frac{AA'}{AA'AA'}$	$\frac{Aa'}{AA'Aa'}$	$\frac{aA'}{AA'aA'}$	$\frac{aa'}{AA'aa'}$
AA' :	$AA'AA'$	$AA'Aa'$	$AA'aA'$	$AA'aa'$
Aa' :	$Aa'AA'$	$Aa'Aa'$	$Aa'aA'$	$Aa'aa'$
aA' :	$aA'AA'$	$aA'Aa'$	$aA'aA'$	$aA'aa'$
aa' :	$aa'AA'$	$aa'Aa'$	$aa'aA'$	$aa'aa'$

Thus are found one offspring with four determiners, four with three, six with two, four with one, and one with none, which is the required ratio.

Blended inheritances in animal species, such as skin color in human beings, can adequately be accounted for by the hypothesis that several genes may affect a given trait. In fact, the number of interacting genes must be very large. In the earlier days of the study of heredity it was often incorrectly assumed that each gene determined one characteristic, a so-called "unit character." This is now known to be a gross oversimplification. About fifty genes affect the eye structure of the intensively studied fruit-fly, *Drosophila*. It is probable that even more contribute to complex human characteristics. A hundred or so cooperating genes could account for all known human variations in height or intelligence, even assuming that heredity were the only causal factor underlying these traits.

Hereditary Determiners and Environmental Influences. (A common misconception of heredity holds that the genes determine certain characteristics absolutely, regardless of the conditions under which the organism develops. This assertion is not true. Hereditary traits are those which develop

from the germinal material under average conditions of environment. There is ample evidence that characteristics which appear in the typical Mendelian ratios in usual environments will not appear at all when circumstances of growth are altered. Conversely, some defects behave as typical inherited traits under abnormal conditions, but do not develop when environments are normal. [An example of the latter case may be taken from the widely studied fruit-fly.³ If certain strains of the eggs of *Drosophila* are hatched under conditions of excessive cold, supernumerary legs will be produced. The occurrence of this abnormality follows Mendelian principles. If the eggs of this line of descent are hatched under normal conditions of warmth, however, the extra legs will be absent. If eggs not carrying the genes for the leg defect are hatched, the defect will not occur, even when developed in the cold.] As Jennings points out,⁴ both heredity and environment are necessary to produce this characteristic. If the eggs with the defective gene hatched in the cold are *A*, those with defective gene hatched in warmth are *B*, and those without the defective gene are *C*; only *A* will show the defect. The difference between *A* and *C* is due to "heredity"; the difference between *A* and *B* to "environment." The same difference that is due to heredity in one instance may be due to environment in another. Many other instances illustrating this point have been demonstrated in a variety of animals.

The genes, then, are merely packets of chemicals from which the individual develops. The course of the growth of these original materials is influenced by environmental conditions, resulting in the characteristics of the mature organism. Since any change in the germinal material may cause a modification of the resultant animal, all traits are determined by heredity. Also, since changes in conditions of development may affect any characteristic, all are influenced by environment. Only when the action of heredity is emphasized by holding environmental factors constant, can its action be observed clearly.

³ H. S. Jennings, *Prometheus*, and, *The Biological Basis of Human Nature*.

Human Heredity. The preceding sections have emphasized the fact that most of our knowledge of heredity is based on observations of plants and lower animals. The human species, on the whole, is poor material for experimental work in this field. In the first place, humans breed too slowly. Three generations of men consume a hundred years, whereas three generations of rats can be bred in eighteen months. A second reason for the inadequacy of direct human data is the large number and complex arrangement of the human chromosomes. On the basis of the various combinations of man's twenty-four pairs of chromosomes alone, there are 282,429,536,481 possible kinds of human individuals.⁵ If the phenomenon of "crossing-over" takes place in humans, as is probable, the number is vastly greater. A third, and perhaps greatest, difficulty in the exact study of human heredity is the complexity of the human environment. No other organism makes such deliberate attempts to mould the traits of its young, nor is any other animal so receptive to modification. Because of these complexities, most data concerning heredity have to be obtained from simpler organisms, but there is no doubt that the same general principles operate in the case of man.

For a number of complex blended traits such as stature, intelligence, and tendencies to emotional behavior, it has been possible to determine approximately the relative contributions of heredity and of various environmental factors. For these characteristics to exist at all requires both nature and nurture, but they are affected in various degrees by the several features of environment. Some recognition is given to the nature-nurture problem in subsequent chapters in which the particular characteristics of the child are considered.

2. THE PRENATAL DEVELOPMENT OF STRUCTURE

The course of prenatal development is perhaps the most remarkable transition in animal life. During this period, the simple fertilized ovum develops into a complex and differen-

* T. H. Morgan, in *Foundations of Experimental Psychology*, p. 31.

tiated multicelled human structure. This growth takes place in two principal ways, first, through increases in the number of cells by cell-division, which is accompanied by progressive differentiation of function, and second, by an increase in the size of many individual cells. The prenatal phase of development may be divided conveniently into three parts. The first two weeks constitute the *germinal* period during which the individual retains an egg-like organization. The second or *embryonic* period is one of rapid change from the ovular form to a structure that is characteristically human in appearance. This phase ends at about the eighth week of development. In the third or *fetal* period which extends to birth, further growth and differentiation occur. During this last phase the organism becomes capable of responding to stimuli, because his behavior as well as his structure becomes organized.⁶

The Germinal Period. The ovum and sperm usually meet in the upper part of the uterine tube, where fertilization occurs. During the next two weeks the fertilized ovum remains about the same size since it receives little or no external nourishment, but marked changes in its internal structure occur. The single cell divides into two cells, these into four, then into eight and so on, until a globular cluster of many cells is formed. (Fig. 9.) Cell differentiation occurs to a certain extent even at this earliest stage, for some of the cells are larger than others and some divide more rapidly. Soon a small cavity forms within the mass of cells and develops until an outer layer and a separated inner cluster of cells may be noted. The outer layer subsequently develops into accessory tissues that serve to protect and nourish the embryo. Only a part of the inner group develops eventually into the child. Further differentiation is soon observed in the inner cluster. Two other cavities appear within it, between which is a flat layer of cells constituting the *germinal disk* from which the embryo forms. During the earlier part of the germinal period, the fertilized ovum is un-

⁶ See Arey, *Developmental Anatomy*; Feldman, *Principles of Ante-Natal and Post-Natal Child Physiology, Pure and Applied*; Jordan and Kindred, *A Textbook of Embryology*; Keith, *Human Embryology and Morphology*; Keibel and Mall, *Manual of*

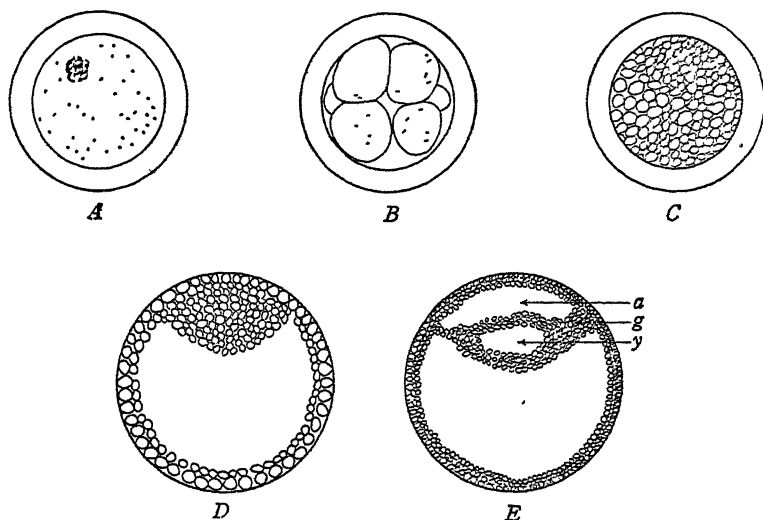


FIG. 9. EARLY STAGES IN THE DEVELOPMENT OF THE EMBRYO

The single-celled fertilized ovum (*A*) divides into a number of cells (*B*), until it is a globular mass (*C*). The two lower diagrams are in cross-section. *D* shows the inner cell cluster. In *E* the two other cavities develop. *a* is the amniotic sac, and *y* the yolk sac, with the germinal disk *g* between. The embryo develops from the triple layer of cells forming the germinal disk.

attached and free-moving. By the end of the second week it becomes implanted in the tissues of the uterus of the mother. From this time the developing child exists parasitically, receiving nourishment from the mother and growing rapidly in size.

The Embryonic Period. The period of development from the third to about the eighth week is one of rapid change. At the beginning of this stage, the germinal disk is noted between two cavities in the inner mass of cells, the amniotic sac and the yolk sac. The cells lining these two cavities differ in character and in their subsequent course of development. Those toward the amniotic sac constitute the *ectoderm* from which the nervous system and the skin develop. Those lining the yolk sac are *entoderm* cells. In embryonic life they are nutritive in function, and develop into the digestive and respiratory tracts. By an interaction of these two layers of cells, a third layer develops between them, the *mesoderm*. From these cells are derived the

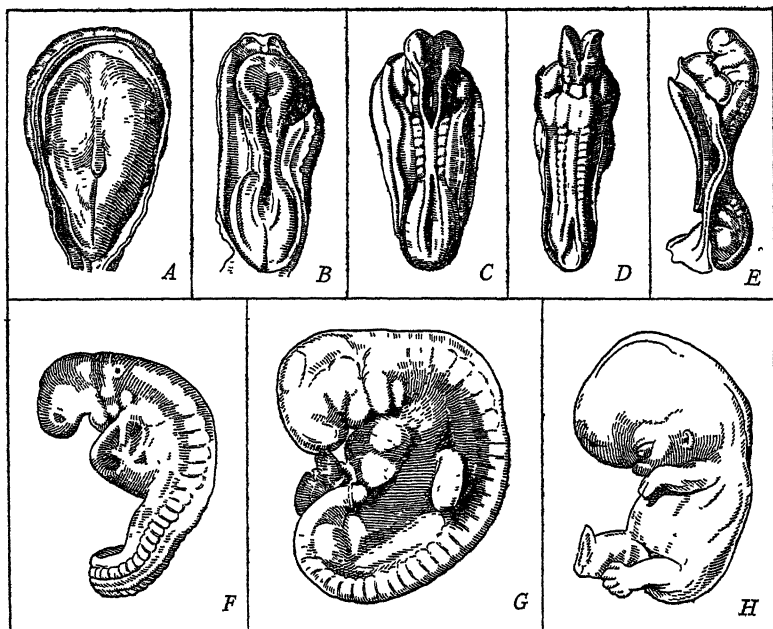


FIG. 10. THE DEVELOPMENT OF THE HUMAN EMBRYO

A to *D* show the development of the germinal disk. The view is downward, the amniotic sac having been cut away. *E* to *H* are side views (*A*, model of embryo aged about 16 days, enlarged $\times 23$ 5; *B*, about 18 days, $\times 22$, *C*, about 19 days, $\times 18$; *D*, about 20 days, $\times 18$, *E*, about 22 days, $\times 12$; *F*, about fourth week, $\times 9$ 5; *G*, about fifth week, $\times 6$ 5; *H*, about eighth week, $\times 2$. After Streeter, in *Scientific Monthly*, vol. 32, p. 500)

skeletal and muscular systems of the body. The three-layered germ disk is at first flat or only slightly convex (Fig. 10, *A*) but soon thickenings and ridges develop in it parallel to a principal axis, and it gradually becomes elongated and tubular. These changes occur in the third and fourth weeks, as is shown in Figure 10, *B* to *E*. Throughout this period the "primitive segments" appear along the back of the embryo, later developing into vertebrae and trunk muscles. The head is very large as compared to the rest of the body. Just below it are the branchial arches which later form structures of the lower face and neck. The heart is very prominent and begins to function as early as the third week.

The growth of the embryo from the fourth to the eighth week is shown in Figure 10, *F* to *H*. The limb buds appear during this time and develop into recognizable arms and legs. During the six weeks of the embryonic stage, the individual has increased in mass 20,000 times (2,000,000 per cent), but he has attained a length of only about twenty-five to thirty millimeters and a weight of about two grams. Still, the eight-week embryo has the typical form of a human being, and would not be mistaken for any other animal.⁷

The manner in which the differentiation of the parts of the embryo is accomplished is not fully known. The position of cells in the original globular mass is an important influence. If the position of cells is changed, they will in many instances develop altered characteristics. Thus, if certain cells left in their original position normally would develop into skin, they may be made to develop into eye tissues by transplanting them to the eye region. There is evidence that certain chemical substances in the early embryo, termed *organizers*, may guide the differential development of cells. When these organizers are applied to other than their original portions of the embryo, anomalies occur. The differences in degree of metabolic activity in various parts of the organism which establish *physiological gradients* have also been held to account for differentiation. Even in the most fundamental development of structure, certain *environmental influences* may affect the nature of development. In certain lower organisms, applications of light, electric fields, X-rays, gravity, and chemical influences have been found to affect even the direction of the axis around which the embryo develops. Prenatal growth is not, therefore, just "by nature," but is influenced both by the cell structure and by the conditions of development.⁸

*The Fetal Period.*⁹ The remainder of the prenatal period,

⁷ For a more complete series of views of the embryo and fetus, see Carmichael, in *Handbook of Child Psychology, Revised*, and standard textbooks of embryology.

⁸ For a fuller discussion, see Child, *Physiological Foundations of Behavior*, chaps. 3, 5, 8, and 13 (especially pp. 221-223); Coghill, *Anatomy and the Problem of Behavior*, pp. 79-110, Jennings, *op. cit.*; and Arey, *op. cit.*, chap. 1.

⁹ See Feldman, *op. cit.*; Williams, *Obstetrics*, Scammon and Calkins, *Growth of the Human Body During the Fetal Period*.

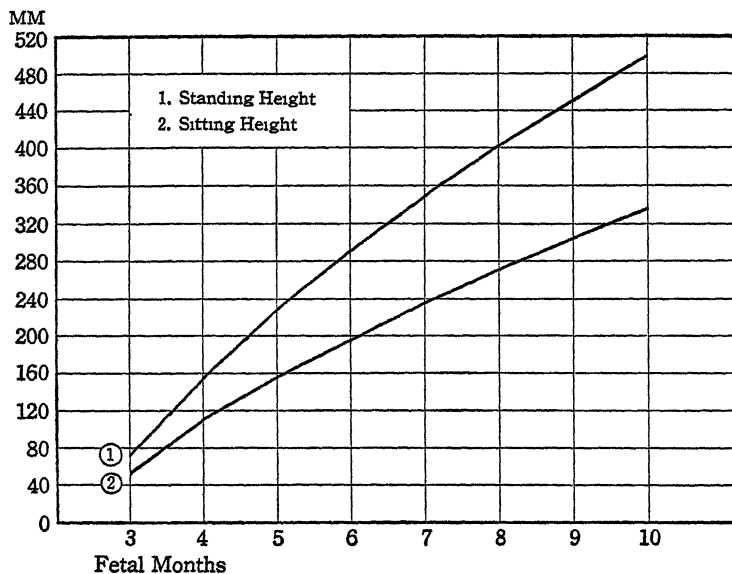


FIG. 11. GROWTH OF FETUS IN LENGTH
(Scammon and Calkins.)

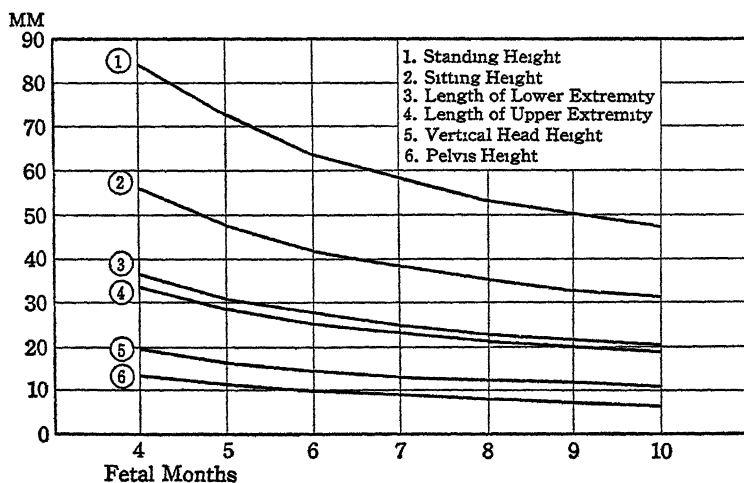


FIG. 12. INCREMENTS OF GROWTH FOR EACH FETAL MONTH
(Scammon and Calkins.)

about eight lunar months, is known as the *fetal* stage. It is marked by rapid growth which occurs during the early part of the period largely by an increase in the number of cells, and during the latter part by an increase in their size. The speed of growth during the fetal period may be seen from Figures 11 and 12. At birth the child's body is seven times as long as at three months. Sitting height is approximately six times as great at the end of this period as at its beginning. The rate of growth is greater during the earlier fetal period than during the later months, as is shown clearly by Figure 12. The rate of growth is expressed as the ratio of the increase during a period to the status at the beginning of the period. For example, the per cent of growth in height during a month is given by:

$$\frac{\text{Increase in height during the month}}{\text{Height at the beginning of the month}}$$

Not only do the sizes of various parts of the young human being change markedly during the fetal period, but the relative *proportions* also change in large degree. From the third to the fourth lunar month, the total length more than doubles. From

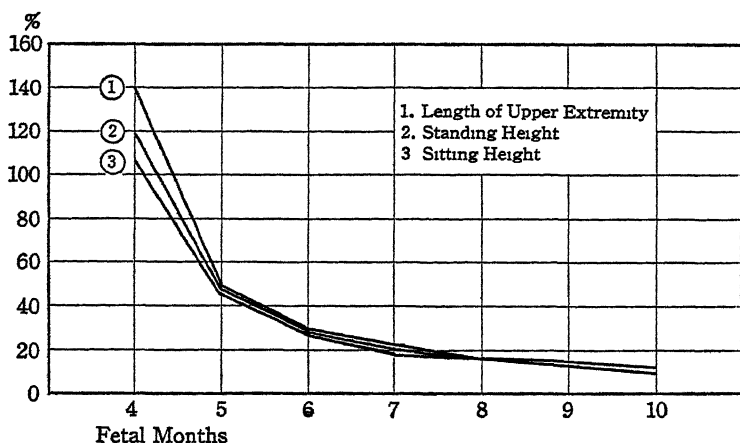


FIG. 13. PERCENTAGE GROWTH FOR EACH FETAL MONTH

(Scammon and Calkins.)

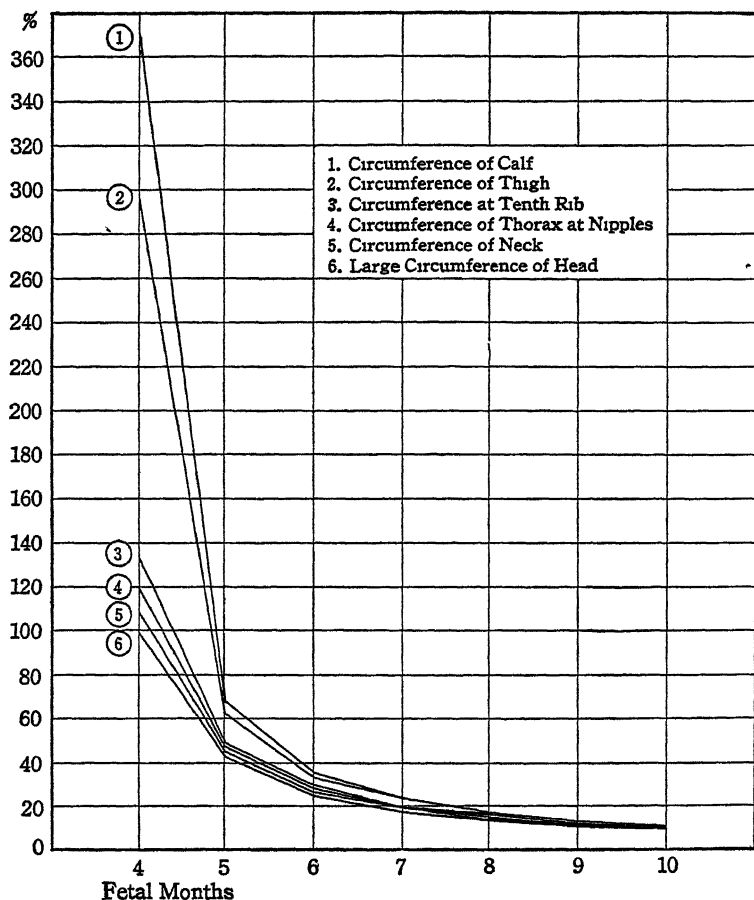


FIG. 14. PERCENTAGE GROWTH FOR EACH FETAL MONTH

(Scammon and Calkins)

the beginning to the end of the ninth month, however, the increase is only one-tenth. (See Figs. 13 and 14.) By the close of the ninth month, head height and head circumference are six times as large as at the beginning of the third month. Height of the pelvis, transverse diameter at the hips and length of lower extremity, however, grow relatively more during the later than during the earlier period. From the third to the ninth month they increase by eight or ten times.

The Development of the Nervous System. Because of its relationship to behavior, the development of the nervous system during the prenatal period is of especial interest to psychology. The fundamental pattern of the nervous system is laid down early in the embryonic period. The first groove in the ectoderm (Fig. 10, A) folds inward to make the *neural tube*. The greater part of the length of this tube develops into the spinal cord, while the upper part becomes further differentiated as the brain. As early as the fifth week the principal brain structures, including the medulla, the cerebellum, the mid-brain, and the end-brain, are distinguishable as enlarged nodes at the top of the neural tube. By the third month the brain has acquired all of its principal structural features. The higher brain centers, however, do not function effectively until about the time of birth.

The neural cells are first differentiated from other body cells at the upper or head end of the neural tube. These send shoots downward along the tube, proceeding, as Child has contended, from an area of high metabolism to one of lower metabolism, or, in other words, down a physiological gradient. As these fibers pass other cells in the neural tube on their way downward, the latter are stimulated to send out processes at right angles to the axis, between the primitive segments. The axial fibers become the connecting portions of the nervous system; those at right angles become the sensory and motor neurones. The nerves, therefore, grow out of the central nervous system, and the branching character of the system is established. The development of neural structure, in general, precedes that of the muscles and of sensory receptors. For example, nerves start growing out to an arm or leg stump before the muscles there are yet developed.¹⁰ During the entire fetal period there is great *neural overgrowth*, the neural structures formed being far in advance of their present requirements. This fact has great significance for learning and the development of intelligence.

¹⁰ See Bolton and Moyes, in *Brain*, vol. 35, part 1; Child, *Origin and Development of the Nervous System*; Coghill, *Anatomy and the Problem of Behavior* (especially chap. 1 and pp. 94-104); Holt, *Animal Drive and the Learning Process*; Jordan and Kindred, *A Textbook of Embryology*, chap. 20 (especially pp. 368, 372-375).

The *sensory mechanisms* also develop during the prenatal period. The structural changes that precede the development of vision begin very early, probably in the second week, and gradually develop until some time after birth. The ear also develops enough to be functional at birth as is shown by studies of its anatomical development. The olfactory mechanisms are sufficiently mature to function in the case of infants born one month prematurely. Taste buds appear early, probably during the third fetal month. The muscular and deep pressure senses, and the skin senses function very early, as may be seen in the account of the development of behavior.¹¹

Laws of Structural Development. Embryologists have long noted that the development of vertebrate embryos tends to proceed from the head or cephalic portion to the posterior or caudal portion. This principle has been termed the "law of cephalo-caudal development" or the "law of developmental direction." Jackson and Scammon have stated this law as follows: "While each part (of the body) passes through its own cycle of changes, these changes as a whole tend to follow what is known as the *law of developmental direction*; for it is generally found that development (including growth and differentiation), in the long axis of the body, appears first in the head region of the body and progresses toward the tail region."¹² Thus, the arm buds appear and develop before the legs, and the head is quite mature before the legs attain their final shape. This can be shown graphically as in Figure 15. In the *late* stages of development the slowest growth is in vertical height of the head, next slowest in growth of the spine, and most rapid in growth of the lower extremities. This means that in the *earlier* period of the first three months, the head has already attained the greatest proportion of its mature size, and the legs the least.¹³

¹¹ See Keibel and Mall, *op. cit.*, pp. 218-258 and 264-290; Mann, *The Development of the Human Eye*; Pratt, Nelson, and Sun, *The Behavior of the Newborn Infant*, pp. 44-51; Feldman, *op. cit.*, p. 237; Parker, *Smell, Taste and Allied Senses in the Vertebrates*, pp. 23-41 and p. 110.

¹² Scammon and Calkins, *Growth in the Fetal Period*, p. 267.

¹³ See Scammon and Calkins, *op. cit.*, pp. 269-270, for another method of comparing segmental growth which corroborates the method we have used.

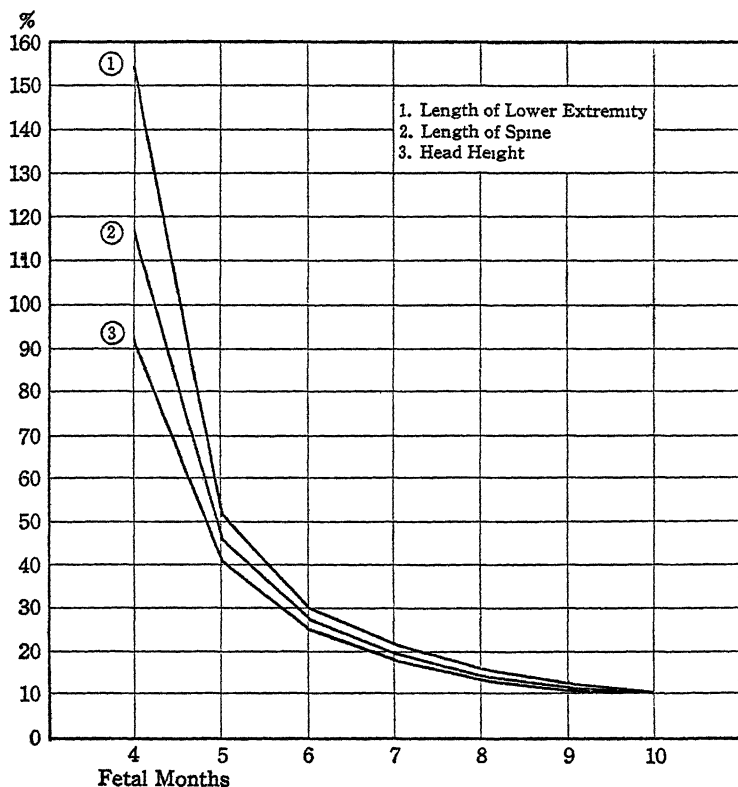


FIG. 15. PERCENTAGE GROWTH DURING THE FETAL PERIOD
(Scammon and Calkins.)

Another developmental law is that structures along the axis (proximal) mature earlier than those farther on either side (distal). This *law of proximo-distal development* is as well demonstrated in the human embryo as that of cephalo-caudal development. Both of these laws will be found significant in tracing the beginnings of function as well as of structure.

3. THE PRENATAL DEVELOPMENT OF FUNCTION

The Development of Motor Responses. A knowledge of the prenatal development of behavior assists greatly in under-

standing the nature of the newborn child. It has been known for a long time that the fetus makes many movements while still in the uterus. Using the stethoscope, the physician can detect these movements as early as from the fourteenth to the sixteenth prenatal week, and usually they are felt by the mother shortly afterward. The beating of the fetal heart, which begins in the third week, reaches sufficient magnitude to be heard by the external stethoscope by the eighteenth week. Considerable interest has been attached to movements of the chest and thorax of the fetus, resembling breathing movements, which may be felt through the mother's body. According to one view these responses are related to the development of the rhythmic action of the respiratory centers of the central nervous system. By another interpretation, they supplement the work of the fetal heart, while a third theory regards them as preparing the organism for true breathing which begins after birth, by strengthening the neuromuscular mechanisms of respiration. Movements of the digestive organs, such as the peristaltic movements, may occur as early as the seventh week. Some responses of the later fetal period may be determined by observing the prematurely born. Contractions of the stomach and periodic stomach tonicity are found among the very premature. Crying occurs among premature infants born in the sixth fetal month.¹⁴

More exact data on the development of fetal behavior have been obtained by applying definite stimuli to fetuses in various stages of maturity and noting the resulting responses. This type of research is most easily carried out with the larval stages of lower animals such as amphibians which develop from a transparent egg and are readily observable throughout the period of growth. Especially notable among such studies are those of G. E. Coghill on *Amblystoma*, a small salamander, which lead to several generalizations applicable to man. The fetal stages of mammals are more difficult to investigate, but

¹⁴ See Carlson and Ginsberg, in *American Journal of Physiology*, vol. 38, pp. 29-32; Carmichael, in *Handbook of Child Psychology, Revised*, pp. 94-99; Sutherland, in *American Journal of Physiology*, vol. 55, p. 398.

several investigators have made thorough studies of the development of the rat, cat, guinea pig, and opossum. The usual method has been to remove fetuses of known fertilization ages into saline baths of normal blood temperature and to observe reactions to various stimuli. Fewer observations, by essentially the same method, have been made of early non-viable human fetuses which were operatively removed to preserve the mother's life. Our best information on the prenatal development of the child comes from the last-named source.

An understanding of the course of development in higher animals and man is greatly facilitated by reviewing the stages of maturation of certain functions in the simpler organism, *Amblystoma*, on which Coghill performed his pioneer experimental work.¹⁵ The description of the development of locomotion in *Amblystoma* is instructive. Up to a certain stage the little organism is *non-motile* and does not respond to tactual stimulation, although the separately developed muscle segments can be stimulated electrically. The *early flexure* stage appears rather suddenly, during which period a touch on the side of the head will produce a bending of the head, usually away from the stimulus. The lower part of the body is not yet sensitive. With further maturity, the bending response extends down the entire body, producing the *coil reaction*. Soon afterward the "*S-reaction*" is seen. In this, a second flexure of the head in a direction opposite to the first starts before the completion of the coil, throwing the organism into an S-shape. *Swimming* occurs when the S-reactions are made with sufficient vigor and rapidity to cause locomotion. Perhaps more significant is the later development of the land locomotion of *Amblystoma*. At first, the legs move only as part of a whole-body reaction, as if the animal were repeating the swimming movement, but on

¹⁵ Coghill, *Anatomy and the Problem of Behavior*; also his articles in *Proceedings of the National Academy of Sciences*, vol. 16, pp. 637-643; in *Journal of Comparative Neurology*, vol. 24, pp. 161-233; vol. 26, pp. 247-340; vol. 37, pp. 37-69; 71-119; vol. 40, pp. 47-94; vol. 41, pp. 95-152; vol. 42, pp. 1-16; in *Anatomical Record*, vol. 2, p. 148; in *Journal of General Psychology*, vol. 3, pp. 431-435; in *Psychological Review*, vol. 37, pp. 264-266.

stilts. Gradually the legs become more capable of independent action, the fore legs preceding the hind legs in maturation. First, the legs become able to move as a whole, relatively independently of the rest of the body. Then, in succession, independent movements of the knees, the feet, and the toes appear. Coghill makes the generalization, which is, as we shall see, applicable to man, that the earlier movements involve a massive action of the entire body. Maturation consists of the progressive differentiation of more specific movements which are "carved out" of the primarily integrated pattern of behavior.

The data on the development of the human fetus include a number of sporadic observations by several physicians, and two organized programs of research, those of Minkowski in Switzerland and of Hooker in America.¹⁶ The observations of the latter were recorded by motion pictures, allowing a careful and leisurely analysis of the reactions elicited. It was found that the development of responses of the human fetus to slight tactile stimulation started in the eighth week, and progressed to about the fourteenth, when almost all of the specific reflexes of the new-born, except breathing, were represented. During this short six-week period, therefore, human behavior appears and reaches a remarkable degree of maturity.

The first reactions observed in the human fetus are not dissimilar to those of *Amblystoma*. To a light tactual stimulation of the neck, the response is a lateral flexion to the opposite side. The arms and legs move only passively with the bodily musculature. By nine and a half weeks of age, this response becomes extended down the body. The cheek is now the most sensitive area, and the response includes not only head and trunk flexion but also a turning movement of the shoulder and rump. At eleven and one-half weeks, the elbow joint and the lower extremities are also involved in the complex response. This sequence is analogous to the downward extension of the

¹⁶ See Carmichael, *op cit*, pp. 99-112; Coghill, in *Archives of Neurology and Psychiatry*, vol. 21, pp. 989-1009; Minkowski, in *Revue Neurologique*, vol. 37, pp. 1105-1118, 1235-1250; and in *Schweizer Medizinische Wochenschrift*, vol. 52, pp. 721-724; Hooker, in *Yale Journal of Biology and Medicine*, vol. 8, pp. 579-602.

total pattern of behavior described by Coghill in the case of *Amblystoma*.

From the twelfth to the fourteenth week the differentiation of motor responses proceeds rapidly. Specific mouth and facial reactions may be observed at this stage. Hand and finger movements appear, similar to the grasping reflex of the newborn. One twenty-two-week fetus feebly retained an object in its hand.

All of the early generalized movements and more definite reflexes seem to operate only through neural centers of the spinal cord. From the fourth month onward, lower brain centers begin to control the nature of the responses, while the cerebral cortex, although formed, probably has little influence before the seventh month. The more essential and simpler patterns of motor response are thus laid down early, leaving the development of the higher centers, which are more important in later coordinated action and in learning, to the period just before birth.

Principles of Motor Development. Some general principles can be drawn from the observations of fetal development in lower animals and man. The most important of these is the generalization stressed by Coghill, that *mass activity* precedes specific behavior in the course of development. Initially, the responses of the fetus are diffuse and non-specific. It reacts as a whole, and in an integrated manner from the very beginning. As maturation progresses, local activities appear by a process of differentiation or of *individuation*, as Coghill calls it. The parts of behavior thus develop from the whole, rather than the whole by the combination of parts, as was at one time believed. "The nervous system concerns itself first with the maintenance of the integrity of the individual, and only later makes provision for local reflexes."²⁷ The same principle is applicable to the development of behavior after birth, as is shown later.

It is also notable that the development of functions follows two principles that also hold for the development of structure. Behavior development, in general, shows evidence of the

²⁷ Coghill; *Anatomy and the Problem of Behavior*.

cephalo-caudal sequence. The first responses in all animals are elicited in the upper region of the body, and progress downward. The principle of *proximo-distal* development is also apparent in the individuation of functions. At first the responses involve reaction mechanisms along the axis. The extremities respond initially only in conjunction with the trunk, but eventually acquire a greater degree of independence and precision of action. This phase of development is not completed before birth but continues during the early postnatal years, as the child develops motor control and skill.

An interesting hypothesis advanced in various forms by Kuo, Holt, and others,¹⁸ calls attention to the possible rôle of environment and stimulation in the development of specific behavior, even before birth. According to this point of view, a reflex first occurs as part of a total pattern of reaction initiated by internal stimuli. If certain sensory stimuli are simultaneously present whenever a given reaction is made, a connection will be formed by the simplest mode of learning, the conditioned reaction. For example, the grasping reflex may be acquired because its stimulus, pressure on the palmar surface of the hand, occurs whenever a fist is clenched. Thereafter, the proper pressure will call forth a definite reaction of grasping. In this way, many reflexes may be *learned* before birth, by the same processes operating in postnatal learning.

Prenatal Sensory Development. The human fetus is sensitive to light cutaneous stimulation from the eighth week onward, as the description of motor development has already revealed. Responses to pressure and to temperature also appear before birth. Skin sensitivities develop first in the neck and head region, and then progress to include the surface of the rest of the body. The fetus responds differently to mild stimuli than to intense ones, especially in the later phases of development. In response to a light touch or stroking, there is a tendency to move the stimulated part *toward* the stimulating object. If the stimulus is strong, on the other hand, the response is more

¹⁸ Kuo, in *Psychological Review*, vol. 39, pp. 499-515; Holt, *Animal Drive and the*

violent and likely to be an avoiding one. The same types of reaction are seen after birth, when they constitute the basis of attraction and repulsion. It is believed that pain sensitivity is poorly developed even in late fetal life, since very intense stimuli that cause tissue injury call forth responses no different from those elicited by moderately strong stimuli. Responses to intra-organic stimuli are quite evident during the prenatal stage.

Eye movements may be evoked before birth, although not by retinal stimulation. These early movements are caused by changes of bodily position and seem related to equilibratory reflexes. Prematurely born infants may differentiate between light and dark, and show the iris reflex. The mechanisms for smell and taste are present in the prenatal stage, but receive no adequate stimulation until after birth. Smell reactions have been found in the prematurely born. Recent experimental work seems to indicate that the fetus may respond to loud sounds a month before birth. This may not be an auditory response, however, but one to tactually sensed vibration. To sounds of ordinary intensity the child is probably insensitive before birth and shortly after, because the external ear is closed and the middle ear filled with a gelatinous substance.²⁹

4. VIEWS OF ORIGINAL NATURE

Past Theories of Original Nature. Before the rise of the present interest in the objective observation of child development, many speculative explanations were proposed to account for the origins of behavior. Among these approaches the *instinct theory* and the *reflex theory* deserve consideration, as they still have some influence on popular thought concerning child nature.

The *instinct theory* held that a considerable number of complex forms of behavior were wholly or in large part native.

²⁹ See Carmichael, *op. cit.*, pp. 112-129; Peterson and Rainey, in *Bulletin of the Lying-in Hospital, City of New York*, vol. 7, pp. 99-122; Forbes and Forbes, in *Journal of Comparative Psychology*, vol. 7, pp. 353-355; Pratt, Nelson, and Sun, *Behavior of the Newborn Infant*, pp. 78-85.

Among the so-called instincts those of acquisitiveness, curiosity, gregariousness, constructiveness, and pugnacity were typical.²⁰ The instinct theory stated that human beings carry out these types of activity because of original nature alone, because of inherent characteristics of the species. Among the criteria formerly used to determine if a tendency were instinctive, *universality* usually held a high place. If a trait appeared in all races and civilizations of man and was not obviously learned, it was usually considered to have come into existence just by the nature of things. Other frequently used criteria were that a trait was native if it *appeared in lower animals* as well as in man, and if it appeared without any opportunity for it to be learned.

The instinct theory is not favorably regarded today for several reasons. In the first place, a more careful observation of child development has shown many so-called instincts to be non-existent in man, their inclusion having been due to analogies drawn from supposed animal behavior. The "hunting instinct" is an example of this class. A second objection is that some so-called instincts are far from purely native, but are dependent on definite training and, in fact, often difficult to teach. Cleanliness, sympathy, and constructiveness are illustrations of such tendencies. The final objection to the instinct theory is that it really explained nothing. Giving a trait the designation of "instinct" does not tell anything about its origin and development, but only asserts that it is present. The instinct theory therefore tended to prevent rather than to encourage further research in child nature. Because of these objections, the instinct hypothesis has been discarded from modern description of child and adult psychology.

Discarding the criteria and theories of the instinct approach, some of the pioneers in the objective study of child psychology concentrated on a determination of what traits are *present at birth*.²¹ Such characteristics, they believed, should properly

²⁰ See James, *Principles of Psychology*, chap. 24; Thorndike, *Educational Psychology*, vol. 1.

²¹ See Watson, *Psychology from the Standpoint of a Behaviorist*, chaps. 6, 7.

be called native. The most commonly discovered specific forms of behavior present at birth were comparatively simple responses to limited stimuli, the reflexes. This view of original nature may conveniently be called the *reflex approach*. According to the early applications of this point of view, the reflexes were the elementary and native particles of behavior, and all more complex activity was built up by learned combinations or "chains" of these simple elements.

Although the concept of the reflex is still very useful in psychology, more recent investigations have led to a considerable modification of the crude theory of original nature that was based on it.

Prenatal Growth and Original Nature. The studies of prenatal development that have been summarized in this chapter have influenced the concept of original nature greatly. Even behavior that is present at birth has a past history, and the embryological approach has been an attempt to make the course of this development clear. The two chief contributions of this point of view may now be restated briefly.

The embryological study of the development of function has emphasized the *primary integration* of behavior. The behavior of the child is not interpreted as consisting of a number of separate and unrelated reflex acts which are afterward put together. In its early development, the fetus first reacts as a whole. The reflexes that are present at birth are only fragments of this whole-behavior that have become differentiated in the early stages of development. The function of the nervous system as a correlator and organizer of behavior is emphasized, rather than as a connection mechanism operating between definite stimuli and responses.

A second valuable contribution of the embryological approach is the stress placed on the *continuity of development*. Birth is no longer regarded as the zero point in human conduct, but only as an incident occurring in a continuous process of growth and differentiation. This concept breaks down the absolute barrier between reflex and habit, and between "native" and "acquired."

These principles are serviceable in the study of postnatal development as well as of prenatal growth. Modern psychology regards the child as an integrated and continuously growing organism, developing under the interacting influences of his own structural characteristics and of the environment about him, both before birth and afterward.

SELECTED REFERENCES

Child, in *Physiological Foundations of Behavior*, chaps. 3, 5, 8, and 13 (especially pp 221-223), Coghill, in *Anatomy and the Problem of Behavior*, pp. 79-110, and Jennings, in *Prometheus* (especially pp 28-64), and in *The Biological Basis of Human Nature*, chap. 5, discuss the influence of environmental conditions upon development; Jennings also discusses heredity in development in *Prometheus*, chap. 2, and in *The Biological Basis of Human Nature*, chaps. 6-8, Coghill, *op. cit.*, chaps. 1-3, and Irwin, in *Psychological Review*, vol. 39 (1932), pp. 128-146, 189-202, 387-393, discuss the organismic hypothesis and differentiation of behavior; Irwin cites the work of many biologists bearing on this problem. An extended treatment of prenatal development is given in standard works on embryology. Arey, in *Developmental Anatomy* (3d ed.), chap. 5, outlines growth changes and body form during the prenatal period, and in chaps. 15-17, the development of the nervous system and the sense organs; Keibel and Mall, in *Manual of Human Embryology*, vol. 2, discuss the development of the nervous system (chap. 14), and of the sense organs (chap. 16). See also the extensive tables and graphs in Scammon and Calkins, *The Growth of the Human Body in the Fetal Period*. Sherman and Sherman, in *The Process of Human Behavior*, chap. 1, discuss "the growth and importance of the nervous system in animals and man." Carmichael, in chap. 2, *Handbook of Child Psychology* (revised edition, edited by Murchison), gives an excellent account of the "origin and prenatal growth of behavior," including a bibliography of 354 titles (to 1932). See also his "Experimental Study in the Pre-Natal Guinea-Pig of the Origin and Development of Reflexes," etc., in *Genetic Psychology Monographs*, vol. 16 (1934), pp. 339-491.

Additional references are given at the end of this volume.

CHAPTER III

THE PRINCIPLES OF LEARNING^{*}

I. DEVELOPMENT AND LEARNING

The Concepts of Maturation and Learning. The development of human behavior is a continuous process which starts long before birth, as was emphasized in the preceding chapter. It has been customary to isolate two principal factors basic to this process of development, which are usually termed maturation and learning. If the first appearance of an item of behavior is correlated with the observable growth or maturation of structure, the event is called maturational development, or simply *maturation*. For example, the contraction of a muscle group involved in a so-called reflex is said to be the natural result of the stimulation of certain sense organs, because the neural structures grow in such a way as to conduct the neural impulse from the sense organs to these particular muscles. Thus the capability of performing the reflex is attributed to the anatomical growth of the necessary structures, including the central nervous system.

On the other hand, some changes in behavior are ascribed to the effects of environmental situations. When a modification or adaptation of behavior is correlated with observable stimulating situations, the process is known as *learning*. The study of the bases of this phenomenon constitutes the principal subject matter of the present chapter.

Although maturation and learning are sometimes contrasted, certain striking similarities between the two processes give rise to the view that they are different aspects of the same thing. It is considered probable that there are unobservable anatomical changes in the central nervous system that accompany learning, and also unobservable stimulating situations which influence the intra-organic development usually ascribed to ma-

^{*} This chapter was written by C. R. Garvey of the Carnegie Institute of Technology.

turation. Accordingly, it is contended that the apparent distinction between the two processes is due only to the need for different terms to describe the conditions in different stages of development. During the prenatal period, the opportunity to observe the stimulations that affect the individual is limited. On the other hand, the minute changes in the mature nervous system, which probably accompany learning, are extremely inaccessible to observation. Hence, the hypotheses of maturation and learning are commonly used to describe earlier and later development, respectively. Whether these are distinct processes, or simply phases of the same process, cannot be settled here with finality. In either case, a study of the similarities between maturation and learning will promote a better understanding of the development of human behavior.

Prenatal Learning. The continuity of development is emphasized by the fact that maturation is not confined to the prenatal period, nor learning to postnatal life, as might be supposed from the previous discussion. Peiper² found by attaching a tambour recording apparatus to the mother's abdomen that the unborn child would not only respond to a loud sound, but if the sound was very loud and sudden the response was such a complex and vigorous movement that it might be called "fear." When the sound stimulus was repeated a number of times the reactions decreased in vigor and complexity and finally disappeared altogether. This reduction of the response was probably not due to fatigue, since the fetus usually failed to respond even to the second stimulus. Thus it had become habituated to the sound. It had learned not to respond. This kind of diminution and disappearance of a particular response upon repetition of the stimulus is often called negative adaptation, but it is an example of learning, namely a modification of behavior as result of an external stimulating situation. A demonstration of the positive type of learning, of the augmentation or appearance of a reaction to a given stimulus as result of an appropriate situation, has been attempted in the case of a human fetus. By means of tambours attached to the mother,

Ray³ was able to record fetal reactions to a loud sound but not to a certain type of mechanical vibration applied to the mother's abdomen. After the vibration and the sound had been presented together a number of times, application of the vibration alone produced a movement of the fetus. Ray was not completely sure but that the fetus might have made this reaction to the vibration even if it had not been subjected to the training situation. According to Hull's view,⁴ however, the preliminary trials with the vibration alone offer some indication that the vibration was originally ineffective and that therefore the final responses to it were the result of learning.

Postnatal Maturation. Evidence that maturation occurs after birth is even clearer than are the indications that learning may occur before birth. Shirley⁵ followed the growth of twenty-three children from birth to one year of age (sixteen of them to two years of age), making repeated tests and observations at short intervals. Her results show that different abilities and forms of behavior appear and develop in a fairly definite order, and that this order is surprisingly similar for all of the babies, even for those who develop rapidly and for those who are not so precocious. For example, while one child may learn to pull himself up to a standing posture by hanging on to furniture before another child can walk when led by the hand, nevertheless each one can walk when led before he can get to his feet, even by pulling himself up. Also, each child can learn to climb upstairs earlier than he can climb down. Of course, there are exceptions to this general rule. Items of behavior which appear at very nearly the same age sometimes appear in one child in an order the reverse of that in another child or of that established by the average of all the children. Of all the items for all the children, however, less than 15 per cent reversed the order of the group. Correlations of each child's sequential order of development of 42 items of motor behavior

³ Ray, in *Child Development*, vol. 3, pp. 175-177.

⁴ Clark L. Hull, in *A Handbook of General Experimental Psychology*, p. 407.

⁵ Shirley, *The First Two Years*; vol. 1, *Postural and Locomotor Development*, and in *A Handbook of Child Psychology*, pp. 242-262.

with the order of the average child were all .93 or above, the majority of children having correlations of .97 or .98. Remembering that a correlation of 1.00 would indicate perfect agreement between the child's program of development and that of the group average, we see that these children all adhered very closely to the same program. The fact that this order of development is not correlated with any program of training imposed upon the children to induce the learning of particular items of behavior in any particular order means that the order itself is the result of maturation rather than learning. Gesell and his associates ⁶ have observed similar constant sequential patterns of development of other forms of behavior. By comparison of premature, term, and postmaturely born infants they have found that the constancy of these patterns is not obliterated even by variations in the fetal ages at which the babies are born. Thus an infant born one month prematurely may be expected, at the age of three months, to behave in many ways much like a typical two-month-old baby. Gesell and Thompson ⁷ have shown experimentally that the effectiveness of learning itself depends upon the degree of maturation which has taken place up to the time the learning situation is presented. Thus, in the case of identical twins, one was given every encouragement to learn in a stair-climbing situation for six weeks up to age fifty-two weeks, and the other was trained only two weeks ending at age fifty-five weeks. At the end of training the one with little practice and greater maturation (age fifty-five weeks) climbed the stairs in an average time of 12.9 seconds, whereas the other one (at age fifty-two weeks) required an average time of 26.4 seconds although she had had three times as much tutoring.

These examples illustrate the rôle of maturation in the acquisition of new forms of behavior in postnatal life. Maturation development, however, like learning, also has its negative instances. In at least two instances, the loss of a reaction is

⁶ Gesell, *Infancy and Human Growth*, and in *A Handbook of Child Psychology*, p. 217.

⁷ Gesell and Thompson, *Learning and Growth in Identical Infant Twins: An Experi-*

correlated with the observable maturing of neural structure. The grasping reflex present at birth, and the Babinski reflex (extension of the toes in response to touch stimulation of the sole), both disappear, usually during the first six months. This is believed to be associated with definite stages of neural growth which occur at the same time as the loss of the reflex. Some disagreement is found as to whether the disappearance of these reactions is due to maturation, or to the learning of new responses that overlie the original behavior. The very confusion on this point, however, argues for the essential unity of maturation and learning.

Cephalo-Caudal Sequence. Just as in prenatal life, so in post-natal, functions appear and develop earliest in the head end of the infant, and progressively later in regions farther and farther removed from the head. This sequence in the development of sensory function is illustrated by the greater sensitivity of the skin on the upper part of the body. As the skin on the lower parts of the body becomes more sensitive, that on the upper parts becomes still more sensitive. The Shermans⁸ studied this by prodding infants with a harmless but supposedly painful needle. Before the infants were five hours old they had to be poked about ten times on the leg but only six or seven times about the head and neck before they would respond. Two stimulations were sufficient in the head region at thirty-five hours of age, but not on the leg until the infants were twice that old. In regard to motor functions, authorities agree that these appear in the cephalo-caudal order. If the infant is placed on his stomach on a table, for example, he raises his head off the table by means of the neck muscles at an earlier age than that at which he can lift his chest. Shirley⁹ has shown that "reactions leading to an upright posture begin at the head and proceed down the neck and trunk to the legs"; that the baby has no control over his head and neck muscles at birth, but that he gains control of them before he can control the muscles of the lower portions of the body. The infant gains motor con-

⁸ Sherman, in *Journal of Comparative Psychology*, vol. 5, pp. 53-68.

⁹ *Op. cit.*, vol. 1, pp. 57 f.

trol of the eyes first, then of the muscles of the head and neck, then of the shoulder, arm, and upper trunk, and later of the lower trunk and legs. The direction of the sequence is obvious and it is probably a maturational phenomenon, although the motor control itself undoubtedly is learned or at least facilitated by opportunities to practice.

Proximo-Distal Sequence. Voluntary control of muscles in the appendages is mastered with respect first to those muscles near the point of attachment and later those at the extremities. From the studies of Halverson and Castner¹⁰ it appears that when an infant four or five months old reaches for a small object, the performance is largely carried on by the muscles of the upper arm and shoulder, the hand being directed (at first without success) and carried passively towards the object by these more proximal muscles. When the arm muscles are first brought under sufficient control to put the hand on the object, the fingers are as yet too clumsy to pick it up except by closing the whole hand. Individual control of the separate fingers comes later, and this explains why the baby can pick up an object an inch square before he can pick up a pill. Thus there is a proximo-distal principle not only in prenatal structure and function, but also in postnatal development of voluntary motor coordination. The latter involves both learning and maturation. Some authors attribute it entirely to maturation, but the fact that learning is operating is clearly shown by an experiment by Dennis and Dennis¹¹ in which practice in reaching, grasping, etc., was restricted as much as possible except that minimum opportunities for these activities were offered at regular intervals to test their development. The result was that these infants did not develop reaching, grasping objects, sitting alone, and standing with help until they were older than the upper limit of the age at which these acts are performed by infants who have ordinary opportunities for practice.

Differentiation of Specific from General Behavior. There is

¹⁰ Halverson, in *Genetic Psychology Monographs*, vol. 10, pp. 107-286; Castner, in *Genetic Psychology Monographs*, vol. 12, pp. 105-193.

¹¹ Dennis and Dennis, in *Journal of Genetic Psychology*, vol. 47, pp. 17-32.

another striking and important characteristic in which learning resembles maturation, and prenatal development resembles postnatal growth of behavior. This is the general-to-specific sequence, or the individuation of discrete acts out of larger undifferentiated modes of response.

Just as in the case of the fetus, stimulation of the young infant produces vigorous general movements of the body as a whole rather than specialized responses of single organs. As maturation and experience with stimulation proceed, the infant progresses to more and more specific responses of local muscles. Some observers have overemphasized the very obvious random or unintegrated nature of these early responses, as if they were composed of a large number of specific reactions. But the response of the infant, like those of the fetus, is a total response in which single acts are to a considerable degree related to the whole and to some extent related to each other. This is particularly true during the first ten days of life. Pratt, Nelson, and Sun¹² give the proper emphasis to both the uncoordinated and the integrated nature of these "general" responses. They point out that almost any group of receptors may be stimulated by almost any kind of stimulus and that almost any part of the organism may respond; that the part of the organism stimulated responds most strongly, whereas the more distant segments respond less frequently and less intensively. However, the response within any given segment is not necessarily well-coordinated. It should be noted also that the commonly known reflexes are more specific responses than those just described, but even these are accompanied by, or are involved in, a general response.

Development proceeds as a gradual increase in the specificity or decrease in the generality of responses, producing particular localized reactions to particular stimuli. At the same time that these reactions are becoming particularized, they are also becoming reorganized into patterns different from the pattern of the original general response. The reflex theory of learning concentrated on this latter process; its error was in

¹² Pratt, Nelson, and Sun, *The Behavior of the Newborn Infant*.

ignoring the former. An example of this increasing specialization of response is the development of reaching. If a small object is presented to a four-month-old infant, he has a tendency to reach for it with both hands. Not only this, but the legs, head, and in fact the whole body are thrown into activity, and the response is so poorly directed that he is very likely not to obtain the object at all. At about the age of six months, the response is more restricted to the hands and he is able to take the object. If a second object is now held out toward him, the infant will probably drop the one he already has, not yet having sufficient independent control of the hands to reach with the other hand while one is occupied. Gesell¹³ finds that 20 to 50 per cent of infants nine months old can even take a third cube without dropping either of two others already grasped. This implies the ability to make a different reaction to each of the cubes at the same time, and also the integration of these three acts into a single organized performance.

Control of the eye muscles also follows a program of specialization and coordination, which explains the fact that the baby can see large objects before the eye movements become specific enough to fixate the gaze on small objects. Not only behavior of the skeletal muscles but also emotional development proceeds from general to specific responses, so that anyone who thinks that he can distinguish fear, rage, anger, pain response, and exasperation from each other in the newborn baby is deceiving himself. The baby learns these emotions by gradually selecting certain parts of the original general emotion as an adjustment to a certain type of situation, and other combinations of parts of the original pattern for other types of situations. Mental and verbal learning also reveal the process of differentiation of specific from general responses. Even the formation of concepts, which is often called generalization, involves specialization as well. At first the baby responds to all objects in much the same way, and when he has attained sufficient differentiation to distinguish animals from other objects, he still does not distinguish one animal from another.

¹³ Gesell, *The Mental Growth of the Pre-School Child*, pp. 80 f.

It is obvious that highly developed, coordinated behavior is composed largely of the specific reactions which result from the process of differentiation, and so it is only natural that infancy should be characterized as a period of learning by differentiation and later childhood as the period of learning by reorganization. We have already noted, however, that these two processes proceed simultaneously, even in infancy. The baby does not break his general behavior up into bits, and then put it back together in new forms. He begins to reorganize it as soon as he begins to particularize it. Infant learning is predominantly but not exclusively differentiation. The integrative factor becomes more and more prevalent until in childhood it is predominant. Differentiation, however, never ceases as long as learning continues. It is not his tender age itself that causes the baby to be a generalized actor, but the fact that he is meeting a new environment which demands adjustment. Just as he kicks, squirms, and moves his whole body in reaching for a bright object, or in just looking at it, so the school-boy in learning to write, squirms, bites his cheek, wraps his feet around the chair legs, and reacts with his whole body. As his behavior becomes confined more to the hand and arm muscles and the movements of the pen become smaller and more uniform from one letter to another, he is said to have learned to write. Even in adult life, generalized behavior is characteristic of the early stages of adjustment to new situations.

In the conditioned response, described in the next section, the reaction is at first general and occurs to a variety of stimuli. During the process of learning it becomes more specific and more restricted to a particular stimulus. Thus the sequence of behavior from the general to the specific is a universal law that applies both to maturation and to learning, and to prenatal and postnatal development.

2. THE CONDITIONED RESPONSE

Many of the most important characteristics of learning may be examined by reference to experiments on the conditioned

response. Originally, the conditioned response was a technique for studying certain modifications of animal and human behavior. More recently, many psychologists have used it as a principle or theory by which all learning may be explained. We shall examine briefly the conditioned response as a precise method of studying the development of behavior, incidentally pointing out some of the applications of the theory to the explanation of children's learning.¹⁴

Conditioning. The most fundamental and elementary characteristic of the conditioned response is the fact that as a result of experience with an appropriate situation the individual responds to a particular stimulus with a form of behavior that he had not previously made to it. He may have made the same or a similar response to other stimuli, but making it to a new stimulus means that he has acquired a new form of behavior, since designation of behavior must include reference to the stimulus which provokes it. The appropriate situation for this learning is one in which the new stimulus occurs just before the desired response is made to some stimulus which is already effective. The process by which the subject comes to make the desired response to the new stimulus, or signal, is called conditioning.¹⁵

In practice, the experimenter, or teacher, presents the signal along with or immediately before a stimulus.¹⁶ Whatever reaction (perhaps unobservable) the child may make to the signal is still in progress when he reacts to the stimulus. Thus the two reactions are merely parts of a single unified response.

¹⁴ For a more complete discussion of conditioned responses, see Garrett, *Great Experiments in Psychology*, Hull, in *A Handbook of General Experimental Psychology*, chap. 9, and Razran, *Conditioned Responses in Children*.

¹⁵ The signal is usually called the conditioned stimulus at the end of the conditioning process but is often called the unconditioned stimulus at the beginning. This is confusing, as the already-effective stimulus is also called the unconditioned stimulus, even though it may have become effective as a result of previous conditioning. The use of the terms signal and stimulus avoids this confusion. Cf. Garvey, in *Journal of Experimental Psychology*, vol. 16, pp. 471-503.

¹⁶ It is sometimes possible to establish a conditioned response by applying the signal after the stimulus, but this is impractical since results are less permanent as well as more difficult to obtain. This point should be remembered by anyone who uses the conditioned response technique in training children.

Ordinarily it is necessary to repeat this procedure a number of times, but finally the subject responds to the signal even when the stimulus is not given to reinforce it. An example will make this clear. A bandage is adjusted around a five-year-old girl's forehead so that it can be quickly and easily pushed down over the eyes as a blindfold, and quickly pushed back up at any time. A pneumatic tambour is attached to the child's throat in such a way as to record any movements of the throat and chin on a strip of moving paper. As soon as the child is lying quietly and the apparatus is recording a straight line which indicates no throat movements, the bandage is slipped down over the child's eyes. At the end of 10 seconds a bit of sweet chocolate is dropped into her mouth. As she swallows the chocolate, the apparatus records her throat activity as a fluctuation of the line on the paper. At the end of another 10 seconds the bandage is slipped off the eyes. After a rest period of 3 minutes the blindfold is again applied, followed 10 seconds later by more chocolate. The third or fourth time this procedure is repeated the record may show that the child has made a swallowing movement after the blindfold is applied but *before* the chocolate is given. Of course this may be an accident, since a child will swallow occasionally without food, as a response to the accumulation of saliva in the mouth. So the procedure is repeated once more and if the child swallows this time after the blindfold and before the chocolate, the experimenter is convinced that she is responding to the application of the blindfold. The blindfold is the signal, the chocolate is the stimulus, and the swallowing is a conditioned response, because it occurs now to the signal without the chocolate, whereas before it would not. ✓

Mateer²⁷ has done this experiment with fifty normal children between one and eight years of age, and similar experiments with fourteen children of low intelligence, some of them feeble-minded. Table 1 shows that, in order to give two successive conditioned responses to the blindfolding, some children re-

²⁷ Mateer, *Child Behavior, A Critical and Experimental Study of Young Children by the Method of Conditioned Reflexes.*

quired as many as eighteen and some as few as three trials with the chocolate. This means that some of them (10) undoubtedly were conditioned by the very first trial. The similarity of conditioning to other forms of learning is indicated by the fact that, on the whole, the younger children and the feeble-minded acquired the behavior less readily than the average. The reliability of these results needs to be verified by studies of larger numbers of children at each age and mental level.

TABLE I. RANGE AND AVERAGE NUMBER OF TRIALS NECESSARY TO PRODUCE CONDITIONED FEEDING REACTIONS ON TWO SUCCESSIVE TRIALS

(Adapted from Mateer, pp. 148-182)

CHILDREN		NUMBER OF TRIALS	
Age (years)	No. of Children	Average	Range
1	5	8	7 to 9
2	7	7	6 to 8
3	6	5	3 to 8
4	12	4	3 to 5
5	8	4	3 to 5
6	9	5	3 to 7
7	3	4	4 to 5
Total normal	50	5	3 to 9
Borderline	7	6	3 to 13
Feeble-minded	7	10	5 to 18
Total defective	14	8	3 to 18

Other experimenters have conditioned a variety of responses, including motor, glandular, emotional, and reflex behavior, using signals in various sense fields. While some responses seem to be very difficult to condition,²⁸ most of them can apparently be conditioned to any signal whatever, provided the subject neither ignores it entirely, nor reacts to it so violently as to interfere with his response to the stimulus. The most suitable signal is one which simply attracts the subject's attention and seems to him to be a necessary or inevitable part of the

²⁸ Garvey, in *Psychological Bulletin*, vol. 29, p. 555.

stimulus itself. Neither of these characteristics is essential, however, as there is good reason to believe that conditioned responses are sometimes unintentionally established when the subject clearly perceives neither the signal nor the stimulus. The important points are that he should respond to both of them at the same time and that the part of the response provoked by the stimulus shall be more vigorous than the part provoked by the signal.

Generalization. The response is so integrated that when the stimulus is omitted the behavior does not revert back to that which was previously provoked by the signal alone, but is similar to the original response to the stimulus. After conditioning, the child is thus seen to respond to a part (the signal) of a complex stimulus-situation (signal plus stimulus) very much as if the whole situation were presented. Children as well as animals have often been observed to give the conditioned response repeatedly to some particular sound, sight, or object which was not intended by the experimenter. This is called a generalized conditioned response and is sometimes carelessly described by saying that the subject responds to a new signal to which he has not been conditioned, simply because of having been conditioned to the old signal. But the new signal is always significantly similar to the old one in some aspect, and it is this aspect which constitutes the real signal to which he was actually conditioned in the training situation.

Since a subject can be conditioned to almost any signal, he may become conditioned to almost any aspect of a stimulus situation (or a number of aspects at the same time), whether the experimenter is interested in this aspect or not. A case in point is that of a boy who was not originally afraid of a rat or a rabbit but who was conditioned to fear the rat by a fearful noise which occurred several times while he was handling it. When he subsequently showed fear in response to the rabbit and even to a fur coat, it became evident that not only the rat, but also the furriness, was a signal to which he had been conditioned. This experiment does not prove that the boy responded to something to which he had not learned to respond.

On the contrary, it reveals more exactly just what he had learned. Many so-called instincts and "innate" personality traits are undoubtedly not instinctive at all, but simply conditioned responses which have not been investigated. We think they are inborn because we do not know how or when they were learned. More complete scientific study of the learning process in animals and young children will reveal not only the source of much adult conduct and misconduct but also the means by which more desirable behavior and personality can be developed.

Another example shows that a response may generalize even to a signal which applies to an entirely different type of sense organ from the original signal, and that the necessary aspect of similarity between the two signals may be a matter of meaning or of some higher mental process. Seven-year-old children²⁹ who had been conditioned to a flash of light as a signal would respond when the word "light" was spoken. They had evidently been conditioned to some idea, or verbal or neural symbol which they experienced along with the visual signal. This symbol was then effective, even when it was produced by an auditory sensory process. Realization that this symbol itself is a response of the organism and serves as a further stimulus, reveals the possibilities of truly complex behavior.

Children were conditioned also using the spoken word as a signal, and they responded to the actual light. That children can respond to their own responses, that conditioning generalizes from one sense modality to another, and especially that it may transfer from symbolic to sensory processes, enormously increase the complexity of the possibilities of the conditioned response theory. These facts extend the concepts of conditioning into the field of the intellectual processes, and give promise of a mechanistic understanding of even the most obscure facts of mental life.

.. *Fading Versus Retention.* If, after a conditioned response is

²⁹ Experiment performed by Kapustnikov and reported by Ivanov-Smolensky from the latter's laboratory. The above facts, but not the interpretation, are from Razran's review *Ob. cit.*, p. 58.

formed, the training process is discontinued for a considerable length of time and the signal then presented, the response may occur as at the end of the training period (retention), or it may not occur (fading), or it may occur with reduced vigor (both retention and fading). Fading and retention, then, are reciprocal measures of the same process.

After Mateer had trained her subjects, she brought them back to the laboratory twenty-four hours later, and found that thirty-six of the fifty made throat movements to the signal, showing retention. Whether there was also some fading in these thirty-six cases could have been discovered by measuring the size of the movements and comparing this with the response at the end of training on the previous day. In at least some of the fourteen cases which showed fading, there was also some retention of the effects of the conditioning, but not enough to produce the actual response. This retention is demonstrated by the fact that when the fourteen children were conditioned a second time, they required, on the average, a smaller number of trials than they had required in the original learning. It is easily apparent that retention and fading are analogous to memory and forgetting. The method of revealing small degrees of retention by conditioning the subject a second time is the same as the saving or relearning method, which must be used to measure memory if forgetting has gone so far that neither recitation nor recognition is possible. The maximum limits of retention have not been worked out, but undoubtedly depend upon the adequacy of the original practice and the subject's subsequent experience. Infants have been observed to retain a conditioned response for seven weeks, but how much longer they might have retained it under more favorable circumstances is not known.²⁰

Unconditioning. After the conditioned response had been restored to those children in whom it had faded, all fifty children of Mateer's experiment were blindfolded repeatedly without being fed. Except for the nine youngest ones, who cried for the chocolate and thus eliminated themselves from the ex-

²⁰ Jones, in *Pedagogical Seminary*, vol. 37, pp 485-498.

periment, this was kept up with each child for from three to twelve trials, until he could be blindfolded twice in succession without provoking the throat movements. This means that repetition of the signal without reinforcement by the chocolate stimulus was the undoing of the conditioned response.²² The undoing was not complete, however, for when the children were again trained with the chocolate they learned the conditioned response more quickly than before. Thus some retention may survive the unconditioning process just as it may survive the fading process, and this retention, too, can be measured by the relearning method.

Unconditioning has been observed by many experimenters working with various kinds of behavior and with various types of human and animal subjects. It is often called unlearning or experimental extinction, and is probably due to the same process as habituation or negative adaptation, to which reference was made earlier in this chapter. The number of trials required depends upon many factors, including the nature of the response, the age, intelligence, and physical condition of the subject, some important but unknown factors, and especially, the thoroughness with which the conditioned response was established before unconditioning is begun. The factor about which scientific knowledge is most reliable is the rapidity with which the unreinforced signal is repeated. If the interval between trials is short, a smaller number of trials is necessary.

Whether it is impossible to uncondition some conditioned responses is not definitely known, but in every case which seems impossible there are one or two probable explanations. First, the behavior may be so firmly established that the necessary number of trials, while not infinite, is beyond the resources of the experimenter or the subject. Second, the signal may be accompanied each time by some reinforcing stimulus which,

²² This is not intended to imply a mere reduction in the effectiveness of the signal. There is a growing realization of the probability that unconditioning and negative adaptation are active processes, involving the substitution of some other (possibly unnoticed) response for the one which is observed to diminish and disappear. See Garvey, in *Journal of Experimental Psychology*, vol. 16, pp. 476 f., and Wendt, in *Psychological Review*, vol. 43, pp. 258-281.

unknown to the experimenter, makes the experiment a conditioning rather than an unconditioning situation. At any rate, if an undesirable response proves difficult to eliminate by mere repetition of the signal, the attempt should be abandoned, and the subject should be conditioned or reconditioned to make some other response to the signal, preferably one which interferes with the undesirable reaction. This can be done by reducing the intensity of the signal and following it each time with a strong stimulus for the desirable response. As the training progresses the signal can be gradually restored to its original strength.

M. C. Jones²² used this means to cure a three-year-old boy of an unfortunate fear. He was afraid of rabbits, white rats, dogs, and even of feathers. A cure had been attempted previously by the unconditioning method and this was largely successful, but the child had a relapse when frightened by a dog. So the reconditioning method was tried. The rabbit was put at a "safe" distance (reducing the intensity of the signal) and the child was given candy and other food (stimulus for pleasant response). This was repeated once or twice a day, and as the child enjoyed his food (the dominant reaction) the rabbit was moved closer and closer (increasing the intensity of the signal), until finally the boy was playing with the animal (reconditioned response). Also he was no longer afraid of rats or feathers (generalization of reconditioning). This method of treatment is a type of reeducation very important for mental hygiene in the home as well as the clinic. It must be intelligently controlled, however, and in the case of violent emotional reactions, only by a competent psychologist, lest the emotion be conditioned to the food, instead of the pleasure being conditioned to the rabbit.

Specialization and Individuation. It has already been pointed out that conditioned responses generalize to various signals and that the order of development of conditioning is from general to specific. It is not surprising that the conditioned response occurs in reaction to various signals, since

²² Jones, in *Pedagogical Seminary*, vol. 31, pp. 308-315.

aspects of these signals are present in the conditioning stimulus situation. Nor is it surprising that the response itself is non-specific in character, since it is a total response to a number of these stimulating aspects acting at the same time.

On any particular trial the real stimulus is the total of all the effective characteristics of the subject's environment. As the training progresses, many of these characteristics vary unavoidably from trial to trial while some remain constant. The portion of the mass response which depends upon the constant characteristics becomes more firmly conditioned to these characteristics, while the portions which depend on the variable characteristics fade. Thus the former portion becomes progressively differentiated out of the mass, making the response more specific in character (individuation). Thus also, the range of signals which will provoke the response becomes

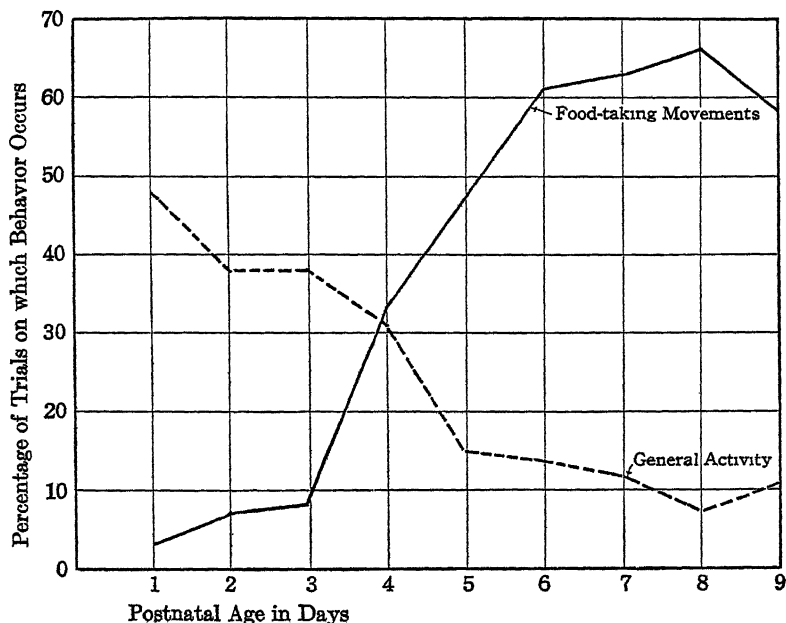


FIG. 16. CONDITIONING IN NEWBORN INFANTS

Amounts of general activity and feeding movements after stimulations from an electric buzzer at feeding times. (Marquis, D P, "Can Conditioned Responses be Estab-

limited to those which display the constant characteristics (specialization).

Figure 16 shows the individuation of the conditioned food-taking response as a decrease in the general bodily activity of infants while they were becoming conditioned to a buzzer in Mrs. Marquis's experiment.²³ The rising curve indicates the progress of conditioning as an increase in the percentage of trials on which the infants made feeding movements of the mouth (such as sucking) in response to the buzzer, which was sounded for five seconds before the bottle was presented each time. The babies were fed six times a day starting when they were twenty-four hours old and from two to five trials were given at each feeding by taking the bottle away and then giving it back after the buzzer had been sounded again. While the percentage of conditioned responses is very small for the first three days, the curves suggest that the conditioning process probably began during the first day of practice, before the infants were two days old.²⁴ The fact that the reduction in general activity was a part of the conditioning process was proved by comparison with the results of a control experiment in which other infants heard the buzzer at each trial but were not given their bottles immediately afterwards. In this case general activity did not decrease. Four infants were used in the control group and eight in the experimental group, although one of the latter did not learn, apparently because of poor physiological condition which affected his appetite.

Differential Conditioning. Specialization has not been adequately analyzed experimentally, because it is difficult to control the fading of reactions to the variable characteristics. When experimenters wish to make a response specific to a particular signal they have found it feasible to uncondition the response to other signals which contain the undesired but not the desired characteristics.

²³ From Marquis, in *Journal of Genetic Psychology*, vol. 39, pp. 479-492.

²⁴ Cf. Wenger's recent experimental work on *Conditioned Responses in Infants* in which the eyelid response was conditioned in newborn infants to tactual vibration of the foot, and withdrawal and respiratory responses were conditioned to auditory stimulations.

Infants have been trained by this method to distinguish between two notes of an organ pipe by the time they are four months old. When the pipe sounded the tone of B_4 , it was followed by food. This was repeated once every day or two until the infants sought food whenever the tone was sounded. They also showed food-seeking behavior when the pipe had a pitch of B_5 , but this was repeated without food until they no longer made the response to it, but only to the B_4 . Table 2 shows the points in the training at which each of these changes in behavior took place. The response had been conditioned to B_4 , generalized to B_5 , and then unconditioned²⁵ to B_5 . This combination of conditioning and unconditioning of the same response to similar signals, called differential conditioning, is a useful method of teaching young children desirable discriminative habits and concepts.

TABLE 2. SIMPLE AND DIFFERENTIAL CONDITIONING IN FOUR INFANTS, THE SIGNAL BEING THE TONE B_4 , THE STIMULUS, FOOD, AND THE DIFFERENTIAL SIGNAL, THE TONE B_5
(Adapted from Razran, after Levikova and Nevymakova)

AGE OF EACH INFANT AT FIRST TRIAL (DAYS)	THE TONE B_4 PLUS FOOD			THE TONE B_5 WITHOUT FOOD	
	Age in Days at First Response to B_4 Alone	Number of Trials Before First Response to B_4 Alone	Number of Trials Before Response to B_4 Alone was Stable	Number of Trials Before Last Response to B_5 Alone	Age in Days at Last Response to B_5 Alone
14	65	91	110	12	120
15	63	126	131	8	120
16	73	126	134	9	122
17	63	48	96	8	110

²⁵ This experiment incidentally substantiates the view, mentioned earlier, that unconditioning consists of a substitution of other responses for the one which is eliminated. The children did not become indifferent to the B_5 but performed actual avoiding reactions.

3. OTHER PRINCIPLES OF LEARNING

The description of the conditioned response, although only an abbreviated account, should be enough to dispel the notion that conditioning is limited to stimulus substitution in the case of simple motor and glandular reflexes. The conditioned response underlies many complex forms of human behavior, and many writers believe that it describes all learning adequately.

In order to understand learning more thoroughly, however, it is desirable to examine it from the point of view of a number of other principles and theories. Many of these are older inventions, and have been the basis for the determination of important experimental facts. Some of the principles of learning which follow are treated briefly, because they are readily available in standard general textbooks.²⁶

1. *Trial-and-Error Learning.* "When left to himself to get out of leggings and shoes, the child pulls and pushes various attachments until he strikes the right fastening or shoestring."²⁷ Thus Wagoner describes the young child's trial-and-error learning, pointing out also that he does not learn at once just what to do, but that after some trials, "like the cat of puzzle-box fame, he learns to escape immediately by doing the correct thing."

This is the way learning takes place when definite instruction is not given, very often because neither the teacher nor the learner has any way of knowing just what stimulus to apply to produce the desired response. The principal characteristics of trial-and-error learning are that general behavior consisting of varied (random) activities occurs, and that the individuation of the correct response out of the general behavior takes place gradually throughout a series of trials. When studied scientifically, trial-and-error learning is usually measured in terms of (1) the reduction in the time required for each successive "es-

²⁶ Cf. especially the psychology texts by Dashiell, Dunlap, Warren and Carmichael, Woodworth (3d ed.), Schoen (chapters on habit, voluntary control, and learning), Hunter, Dockeray (3 chapters), Goodenough (applies particularly to children), and Educational Psychology texts by Gates, Jordan, Sandiford, and Skinner (ed.).

²⁷ Wagoner, *The Development of Learning in Young Children*, p. 19.

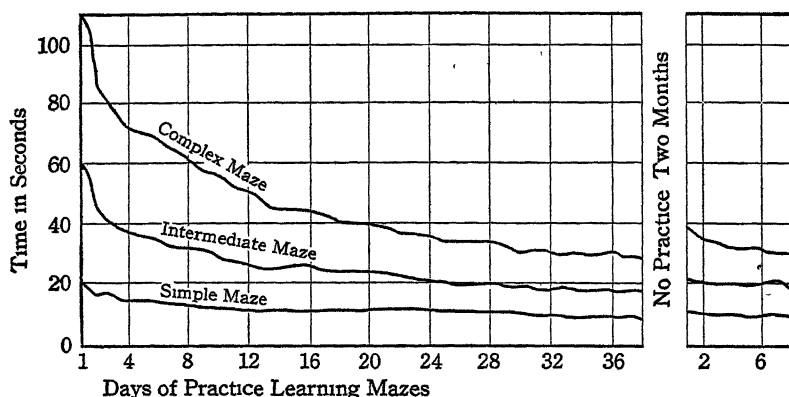


FIG. 17. LEARNING CURVES (TIME) OF TWENTY-FIVE CHILDREN, AGES 58 TO 71 MONTHS
(Mattson.²⁸)

cape," (2) the reduction in the number of random movements (errors), (3) the total number of trials necessary to attain a certain degree of skill, or (4) the number of trials necessary to reach a point beyond which further practice produces no further improvement. The measurements of the first or second type may be plotted in the form of a learning curve to show rate of improvement at each stage in the course of learning. Curves for a number of children are often averaged. This procedure obscures the differences in speed of learning between different children and also the fluctuations in speed of each child, but it permits comparisons of the learning of different tasks. Figure 17 shows such a comparison of the learning of maze pathways of different degrees of complexity by twenty-five children in Miss Mattson's experiment.²⁸ These curves are based on the time required for the different trials, while those of Figure 18 are based on the number of false moves made on various trials. A curve (Fig. 19) of a different form (practically a straight line) was found by Mrs. Hilgard for improvement in a very different kind of performance.²⁹

²⁸ Mattson, M. L., "The Relation between the Complexity of the Habit to be Acquired and the Form of the Learning Curve in Young Children"; *Genet Psychol. Monog.*, 1933, vol. 13, pp. 299-398.

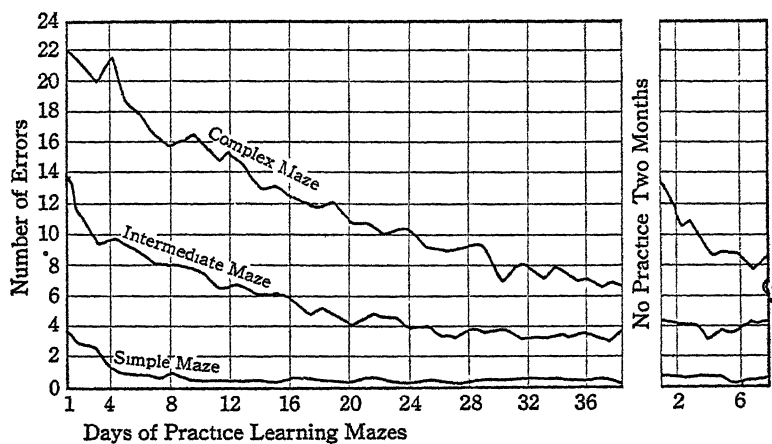


FIG. 18. LEARNING CURVES (ERRORS) OF TWENTY-FIVE CHILDREN
AGES 58 TO 71 MONTHS
(Mattson.²⁸)

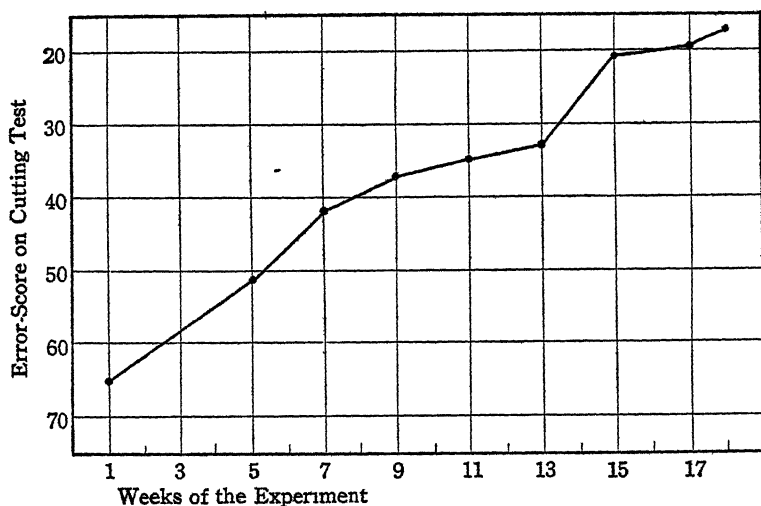


FIG. 19. IMPROVEMENT IN CUTTING WITH SCISSORS
Twelve weeks of practice, beginning on the fifth week of the experiment.
Ten children, average age 28 months. (Hilgard, *op. cit.*, p. 51.)

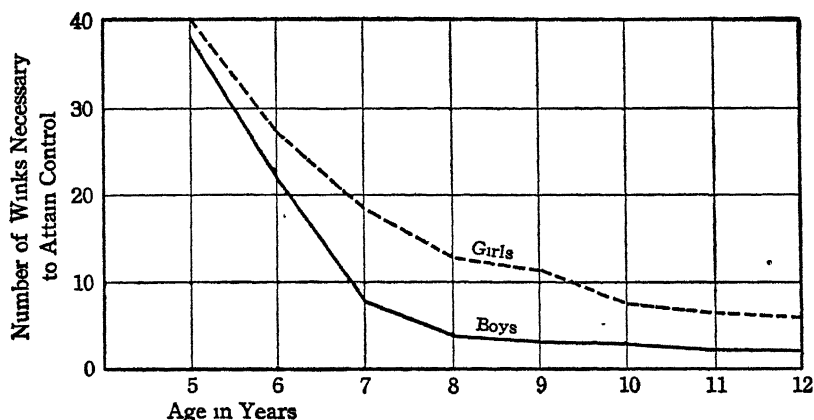


FIG. 20. AMOUNT OF PRACTICE TO CONTROL THE REFLEX WINK AT VARIOUS AGES

Curves smoothed. (Partridge.)

Measures of the third and fourth type provide means of expressing individual differences in learning, the third with reference to a standard quality of behavior and the fourth with reference to the maximum quality or limit of learning for each child. Since these maxima are different degrees of skill for different children, they too represent individual differences, but not in speed of learning. Since individual differences of any of these kinds may depend upon various factors such as age and intelligence, they may be classified according to different amounts of a factor, and plotted into a curve, an age curve, for example. These curves often resemble learning curves but should be distinguished from them. The number of trials which children require before gaining a certain degree of voluntary control of the winking "reflex" when the eye is threatened has been studied by Partridge.³⁰ Figure 20 gives an age curve, showing clearly that up to age 11 or 12 and especially up to age 8, older boys can usually learn this trick more quickly than younger ones. Since there is a sex factor as well as an age factor in this task, for boys usually learn it faster than girls of their own age, a separate age curve is presented for the girls.

³⁰ Partridge, in *American Journal of Psychology*, vol. 11, pp. 244-250.

Such large differences between the sexes, however, are not found in the learning of most performances, nor is either sex consistently better than the other. Even in learning to control the wink there may be no native sex difference. The boys, especially the older ones, probably had more incidental practice than the girls (as in boxing) before the experiment began.

Comparison of the curve on cutting (Fig. 19) with those on the maze (Fig. 18) shows that, whereas maze-learning is more rapid during the early stages of practice than during the more advanced stages, improvement on the cutting test proceeds at about the same rate throughout the experiment. The fact that this rate is about the same as the rate of improvement before the practice began suggests very strongly that the age or maturation factor is more important than learning in producing this improvement. It is by thus analyzing, classifying, and comparing the results of learning under various conditions that those conditions which influence learning are discovered. If all the factors were known and could be controlled, the learning would not need to proceed by trial and error.

2. *Motivation.* The factors which cause the child to proceed at all, to persist in trial and error until learning is accomplished, are called motives, and their operation in the learning process as well as their application by parents and teachers, *motivation*. This is such a comprehensive subject that a chapter is devoted to it later. Accordingly, it is passed over here with brief mention. Motives are of different kinds, varying all the way from the simple stimulus itself in the conditioned response situation, to an ambition to make something of oneself, or an interest in baseball, or in the welfare of mankind. A motive is sometimes defined as anything which induces action and is usually thought of as a secondary stimulus or condition which promotes learning by causing the individual to get himself into a learning situation or by increasing the amount of practice. In trial-and-error learning hunger may be a motive or drive, because it increases the amount of varied behavior and thus hastens the time when the correct response will be made. Hunger, thirst, and sexual tension are innate physiological drives to activity.

Interest and desire are learned motives. Thus it is obvious that the results of learning may serve as motives for further learning.

3. *Contiguity.* One of the fundamental principles of learning is the law of contiguity. It means that, if the subject is to learn to make a certain response to a given stimulus, the latter must occur at the same time or very nearly the same time as some other stimulus which is already effective in provoking that response. This is necessary so that the original reaction to the first stimulus may become a part of the total response, which will persist after the second stimulus no longer accompanies the first one. The operation of this law is illustrated in the case of the conditioned response, in which the signal is presented together with or just before the stimulus. The law was first discovered in connection with ideas. If two ideas occur together, then (at some later date), whatever provokes one of these ideas will tend to provoke the other also, or one of the ideas itself will tend to provoke the other. The ideas are said to have become associated. Contiguity is thus the basis of the association of ideas as well as the basis of conditioning.

4. *Intensity.* After two ideas occur together, the recurrence of the one does not always bring the other to mind. The conditioned response sometimes appears after the signal and stimulus occur together once, and sometimes it does not. If the ideas are very vivid or strong, they are more likely to become associated and if the response is very vigorous or intense, it is more likely to be conditioned. This is the law of intensity. It may be stated in terms of the intensity of the stimulus, since more intense stimuli usually provoke more intense responses. Intensity is no doubt a part of the explanation of the fact that a very severe fright is more likely to condition a person to fear some object than is a mild scare. There is a limit, however, to the benefit derived from increasing the intensity of the stimulus, because an extremely intense stimulus usually evokes other responses than the one aroused by the stimulus of medium intensity, and these often interfere with the desired response.

5. *The Law of Effect.* Many experimental data seem to justify the conclusion that the more pleasant or satisfying the re-

sults of a response are, the more likely the response is to be learned or conditioned. Whether this is a fundamental law or only a superficial fact, that is, whether the satisfying effect of the response really influences the learning or only accompanies it, has not been definitely agreed upon by authorities. Many important facts indicate, however, that it should not be ignored by anyone entrusted with the training of children. After all, any theory of learning has two functions, the scientific and the technical. Its scientific purpose is to lead to hypotheses which can be tested experimentally to see if the theory itself is correct. Its technical purpose is to suggest applications to actual situations which may promote learning. If a certain application of the law of effect is beneficial, it should be employed, even though it is not a crucial test of the validity of the law. The use of rewards and punishment is, of course, a very obvious application of this law. Another application is that the reward will be most effective when it is related to an actual motive; food, for example, being a good reward when one is hungry, knowledge when one is curious, etc. Also, the reward will be most effective when it is the natural result of the behavior to be learned, or at least when it follows closely the performance of the behavior. All these rules have been profitably applied by many teachers. A word of caution may be in order, however. The intensity of the pleasure produced is not always proportional to the quantity of the reward received, and since large quantities of a reward often destroy the motive (as food, for example, dispels hunger), it is often practical to apply small rewards so that the motive will remain active and promote learning in subsequent trials.

6. *The Law of Exercise.* This law has been stated and interpreted in many ways which have caused it to be criticized. "Practice makes perfect," for example, is obviously questionable since persistent errors and bad habits are probably as much the result of practice as are the "perfect" forms of behavior which they mar. "The more a response is made to a given stimulus, the more firmly it will be learned as a response to that stimulus" has been challenged because of the facts of uncon-

ditioning and negative adaptation and also because a response is sometimes repeated a large number of times and seems to become neither conditioned nor unconditioned.

Instead of the law of exercise Dunlap³¹ has proposed three laws which cover the three facts just mentioned, and which may be summarized briefly as follows: Repetition of a response to a stimulus (1) will cause it to be learned, (2) will cause it to be unlearned, or (3) will have no effect on its learning, depending upon whether the conditions are favorable for learning, unlearning, or neither. The second one has been successfully applied to the breaking of many bad habits, success depending upon finding or supplying the adequate conditions. For this purpose use is sometimes made of the law of effect (making the result of the response unpleasant, or robbing it of its satisfyingness), of suggestion, or of some opportunity for substituting another response for the bad habit.

If conditions are favorable for learning, however, practice will promote learning. In the conditioning experiment, contiguity of stimulus and signal is not only favorable but essential. Even when we provide and try to maintain favorable conditions for learning, conditions for unlearning may occur at various stages in the process of practice. These and other factors produce fluctuations which are found in practically all learning curves unless they are artificially obscured by averaging. Figure 21 shows curves from which the fluctuations have not been eliminated entirely. Some have suggested that repetition is effective because it supplies cumulatively the intensity which is necessary but which it is impracticable or impossible to apply in a single trial; and that repetition itself does not produce learning, but merely gives the real conditions of learning more chances to operate. At any rate, if one trial produces a tendency toward learning, repetition of the situation will produce an accumulation of this tendency, whether it is a matter of learning to make some particular response or to substitute some other response in the place of it. The theory that unconditioning or negative adaptation is really the substitution of

³¹ Dunlap, *Habits, Their Making and Unmaking*.

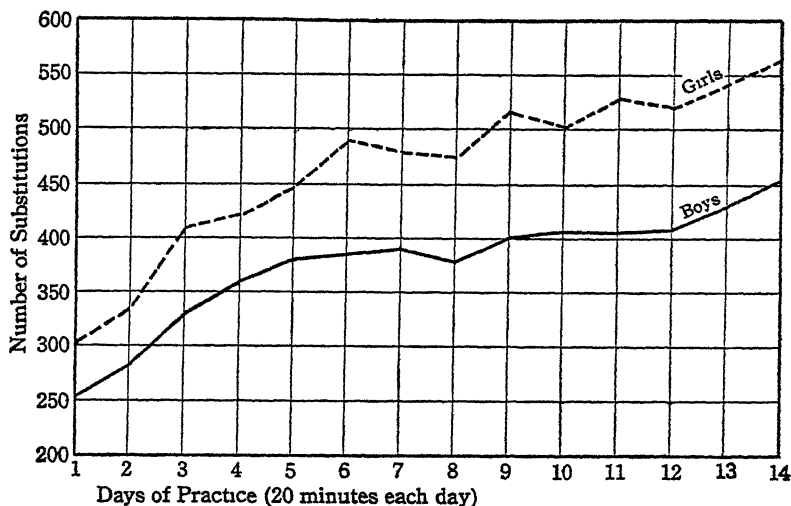


FIG. 21. LEARNING CURVES FOR SUBSTITUTION OF 18 BOYS AND 20 GIRLS, AGE 12 YEARS

(Brooks.)

some other response has already been mentioned. On this basis it can be seen that repetition promotes learning in both the conditioning and the unconditioning situations, but that different responses are being learned in the two cases.

7. Integration. While attending to the details of analyzing the factors involved in learning one should not forget what was pointed out earlier, namely, that development, including learning, is characterized by integration and organization. Learning does not proceed by simple addition of separate responses. The responses do not remain separate; instead they influence the total response, so that the latter, far from becoming less unified, becomes more unified. The particular muscle contractions, movements, or ideas which are involved in the learning process may drop out and the same adjustment of the individual to his environment remain, or an even better adjustment result. The thing that is learned is the total response to a total situation. The degree of integration of the behavior, whether it be muscular or mental behavior, depends upon the development of the

nervous system as well as upon previous learning. In general, older children are capable of more complex and highly integrated as well as more highly differentiated behavior. Nor should it be supposed that a child's response to a certain situation is more complex than his response to another, just because an adult has analyzed the first into elements. No one supposes that the child's perception of water is any more or less complex than it would be if water were composed of a single element, or three, instead of two. And yet it was a long time before teachers realized that children could learn to read by responding to words, phrases, and sentences instead of letters, and that the "larger" habits really are simpler.

Integration and organization of behavior commonly proceed tediously, and yet some organizations are learned with such suddenness as to defy description of the process of learning. Many attempts have been made to explain these instances, some based on the laws of learning established by study of slower learning, some by hypothesizing a new principle, and some by merely giving a name to them. None of these attempts has been entirely successful but all of them should be encouraged except those of the third type. *Belongingness* has been proposed as a relationship between two things which causes them to be integrated into a whole by the learner. There are only two tests of belongingness: (1) whether it is perceived by the experimenter, which is obviously irrelevant, and (2) whether the learner makes the integration. If the integration is made by one individual and not by another, then belongingness exists for one and not for the other. These differences in the operation of belongingness may possibly be explained in terms of the previous learning of the two individuals, and in terms of the characteristics of the two situations. Leading proponents of "belongingness" have recognized this, and have attempted more detailed analyses. Some of their followers, unfortunately, have used the term only as a name, which obscures the issue instead of clarifying it. *Insight* is the same sort of explanatory principle but is attributed to the individual instead of the situation. If one child puts two sticks together to

make a longer stick, and another child does not, the one is said to have insight and the other to lack it. Obviously, for the one child the sticks belong together, and for the other they do not. If the terms are used as mere labels, "insight" and "belongingness" are thus only two modern ways of saying that the child *does* put the sticks together. The important problem is not which way to say it, but how the child learns it.

4. SUMMARY

In Chapter II the origins of human behavior are set forth and related to prenatal growth. In this chapter the continuity of behavioral development, the beginnings of learning before birth, and the continuation of maturation past birth are pointed out. It is shown that behavior, like structure, develops according to certain biological laws and orders. Chief among these in infancy and early childhood are the cephalo-caudal order and the general-to-specific sequence. Behavior is at first diffuse, total, and general. It develops largely by differentiation and individuation. Maturation and learning are intimately related, especially in the infant. As soon as behavior starts to develop by differentiation, it begins to develop by integration of the products of differentiation into new wholes whose patterns are different from the original mass behavior, and better adapted to the environment. Individuation and reorganization are integral phases of the total process of development and continue as long as the individual lives and learns.

The conditioned response is a convenient and precise method of influencing and of describing both the individuation and the integration of behavior as these proceed under the influence of experience in environmental situations. The necessary conditions for this development, or learning, are (1) activity, or responses, (2) stimuli which will provoke the responses, (3) situations or signals to which these responses may become conditioned, (4) contiguity, or intimate temporal relation between the situations and the stimuli, and (5) a certain amount of intensity. Intensity may have to be obtained by repetition.

Factors which promote learning are motivation, reward, and practice.

Behavior consists of total responses to total situations, and the learning of new forms of behavior is really the modification of the previous pattern. Insofar as is known at present, higher forms of learning involve the same laws and principles as simpler forms, but the situations and responses are different. In describing any particular learning, it is necessary to discern just what the effective stimulus-situation is, and to take into account the previous experience of the child and the attained degree and kind of integration of his behavior. The so-called highest forms of behavior are those which involve ideas and are carried on in terms of symbolic processes, such as abstract concepts, instead of merely in terms of muscular and glandular processes.

SELECTED REFERENCES

The psychology of learning is discussed in standard textbooks on general and educational psychology: Boring, Langfeld, and Weld, *Psychology*, chap. 13; Dashiell, *Fundamentals of General Psychology*, chaps. 14, 15; Dockeray, *General Psychology* (revised), chaps. 23-25; Dunlap, *Elements of Psychology*, chap. 9, Gates, *Psychology for Students of Education* (revised), chaps. 8-13; Hollingworth, *Educational Psychology*, chaps. 2, 8, 9, 18, and Part III; Murphy, *A Briefer General Psychology*, chaps. 13-15; Pintner, *Educational Psychology*, chaps. 8-12; Sandiford, *Educational Psychology*, chaps. 9-14, 16, 17, Skinner *et al.*, *Educational Psychology*, chaps. 3, 5, and 12-14; Woodworth, *Psychology* (third edition), chaps. 10, 11.

For discussions of learning with special reference to children and with practical applications to many pre-school and out-of-school problems, as well as to school problems, see Blanton and Blanton, *Child Guidance*, chaps. 3, 5, and 6; Blatz and Bott, *Parents and the Pre-School Child*, chaps. 2-6; Stoddard and Wellman, *Child Psychology*, chap. 10; Wagoner, *The Development of Learning in Young Children*, chaps. 2, 4-6, and 14.

The *Thirty-Fourth Yearbook* of the National Society for the Study of Education contains material on diagnosis of learning difficulties of school children. Section I deals with factors associated with learning difficulty (physical, intellectual, pedagogical, emotional, social, and environmental); section II, principles and techniques of educational diagnosis and treatment; section III, diagnosis and remedial instruction in the school subjects; and section IV, diagnosis and remedial instruction in relation to health education, behavior disorders, speech, vocational interests, ability and aptitude, and special talents.

See also references at the end of this volume, and a review of recent literature on children's learning by Meek and Jersild, in *Review of Educational*

CHAPTER IV

THE BEHAVIOR OF INFANTS

As the twig is bent, so the tree's inclined.

Old proverb

No matter if the twig is bent, 'twill straighten when a tree.

Chinese proverb

I. THE SIGNIFICANCE OF INFANCY

THESE two contradictory proverbs illustrate the diversity of opinions that have been expressed concerning the significance of early infancy. In the past, infancy often was held to be a *transitional stage* of small importance and of slight influence on the periods following it. According to this point of view, infancy was only a time when a certain maturation, preordained by heredity, took place, but when environmental influences had little or no effect. According to an extreme form of this theory, infancy has no influence upon development during childhood and adolescence is merely "a stage which is left as much behind as the rungs of a ladder after the summit is reached."¹ Although entirely discarded by psychologists, this attitude is reflected in the conduct of many parents. They believe that the infant is too young to understand anything, and that how he is treated is therefore a matter of no consequence.

In sharp contrast to the former attitude, most authorities today regard infancy as the *formative period* when the foundations of personality are firmly and permanently laid. A mass of evidence now indicates the importance of infancy and suggests that mental as well as physical growth is a continuous process from the prenatal period to maturity.

Many authors have noted the significance of the increasing length of infancy, as the lower and higher forms of the animal scale are compared.² The longer period of immaturity charac-

¹ Gesell, A., *Infancy and Human Growth*, p. 18.

² Fiske, *The Meaning of Infancy*.

teristic of man enables him to secure better preparation to cope with his complex environment. In comparison with his capacities when mature, the human infant is indeed helpless. He is able to exist only because adults arrange the environment so that he can meet it effectively with his meager repertory of adaptive responses.

General Theories of Infant Behavior. Before proceeding to the detailed account of infant behavior, it is desirable to gain a preliminary orientation as to the nature of the reactions of the very young, and as to the nature of development. One outworn theory treats the child as if he were an *incomplete or miniature adult* who lacks certain functions such as speech, reproduction, locomotion and intelligent behavior, and has other functions only in an imperfect form. Development, from this point of view, is regarded as the acquisition of some fundamental adult functions and the perfecting of others. Unfortunately, the practical application of this attitude continues, although the theory is no longer tenable.

A second theory regards the young infant as primarily a *creature of reflexes*. His behavior embraces many simple reflexes, some more complex ones, the primary emotions, and possibly some other behavior patterns known as instincts. Development from infancy to adult life comes essentially from the modification and combination of these specific patterns of response.

According to a third point of view, regarded as more useful today, the infant is neither a miniature adult nor a collection of specific reflexes. His behavior at first is more generalized, and development involves an increasing specificity of responses. As Irwin says,³ "Few definite sensory points are hooked up specifically with motor points as is called for by the reflex theory. The specificity demanded by the theory simply is not the rule in infant behavior." This point of view must be kept in mind throughout the discussion of the behavior of early infancy. Although it is often convenient to inventory the child's

³ Irwin, in *Genetic Psychology Monographs*, vol. 8, p. 83. See also Pratt, Nelson and Sun. *The Behavior of the Newborn Infant*, p. 207.

specific responses, these must be thought of as emerging from the original matrix of behavior-in-general.

2. MOTOR BEHAVIOR IN EARLY INFANCY

What does the baby normally do during earliest infancy? What sorts of reactions or responses does he make? What kinds of behavior may be elicited in experimentally controlled situations?

Behavior of the Newborn Infant. Until birth the child has been dependent upon his mother for respiration, nutrition, and elimination. These functions have been carried on through interchanges in the placental membranes. Beginning with birth, however, he must do these things for himself. One of the first signs of overt behavior is the birth cry, probably caused by the rapid passing of air over the vocal cords. Sometimes it has to be induced artificially by gently slapping or by dipping in warm or cold water. The birth cry is supposed to inflate the lungs and start off respiration. When the baby has some degree of hunger, sucking movements are readily induced by lightly touching his lips. Elimination of waste products begins within a few hours after birth. The three vegetative processes — eating, breathing, and elimination of waste products, together with sleeping, are necessary for his post-natal existence. Usually he begins them all from within a few seconds to a few hours after birth. He is now ready to carry forward his independent existence, if given the food and care which his infancy requires.

The newborn child spends approximately eighty per cent of his time sleeping. The separate periods of sleep usually are very short, rarely exceeding three hours⁴ in length. Probably they are broken by hunger pangs or some other discomforting condition. Once the source of discomfort is removed, however, the infant drops off into another period of deep sleep. When awake he is incessantly active, wriggling and waving arms and legs, stretching, moving lips, hands, eyes and nose, in a random,

⁴ See Bühler, *The First Year of Life*, pp. 111-112.

uncoordinated manner. If he is asleep and becomes uncomfortable (cold, wet, hungry, or in pain), he awakens. After a few seconds he begins to cry intermittently. Soon, however, is likely to follow a period of continuous crying in which he brings every part of his body into action. He flexes and extends his arms, legs and toes; he is engaged in squirming, kicking, rolling his body and head, and crying rhythmically. All this activity is found in the normal, healthy infant during the first days of post-natal life.

The following activities have been observed during the first twenty minutes after birth: sneezing, yawning, the secretion of tears, sucking at the nipple, fixating on a light, putting the thumb in the mouth, jumping at loud sounds, grasping, crying with a box-shaped mouth, crying with the corners of the mouth pulled down, following a moving hand with the eyes, turning the head so as to get air when placed on the face, turning over when given a very slight advantage, and the cry of so-called anger.⁵ Not every infant, however, showed all of these activities during the first twenty minutes after birth.

Extent of Motor Activity During the First Two Weeks. Although the newborn infant sleeps most of the time, he is not quiescent during this period, but is very active. When infants are observed at home, clothing and covers often hamper their activity and prevent the observer from seeing all the movements actually made. When carefully observed under good experimental conditions,⁶ however, they are found to be very active, making in 15 to 18 hours from 500 to 3000 movements which observers could record, and from 10,000 to 45,000 which were recorded on the self-recording apparatus used.⁷ This was an

⁵ Blanton, in *Psychological Review*, vol. 24, p. 482.

⁶ See Pratt, Nelson, and Sun, *The Behavior of the Newborn Infant*, for a description of apparatus and techniques used to study infants at the maternity or nursery ward of a hospital. A carefully designed experimental cabinet was used. Each infant was placed in it at certain times for study. An elaborate self-recording system was used to secure accurate records of his activities. Carefully trained observers also recorded their observations of his movements. See also Stoddard and Wellman, *Child Psychology*, pp. 53-57.

⁷ See Irwin, in *Genetic Psychology Monographs*, vol. 8, pp. 1-92; and in *Journal of Comparative Psychology*, vol. 14, pp. 415-428.

average of 11 to 43 per minute, or about one every one or two seconds. During the first ten days after birth movements of head, body, arms, and legs occur, as well as those movements involved in the production of sounds. During this time the infant turns the head to the left and right, draws it back, opens and closes the mouth, purses and licks the lips, closes and opens the eyes, winks, yawns, and tightens the eyelids when closed. He may move the body from lying on the back to lying on either side (usually a rapid movement), squirm or twist the trunk (usually slowly), stretch (with arms stretched over the head, legs extended, and trunk tensed), breathe rapidly, cry, shudder, gasp, jerk the body quickly, and arch the back. He moves his arms a great deal, flexes and extends them, slashes them about in various directions, throws them over his chest, and moves his hands and fingers. He moves his legs, feet, and toes, flexing, extending, kicking, jerking, rotating, rolling, or trembling. He makes many sounds which are referred to as crying, coughing, sneezing, smacking lips, sucking sounds, choking noises, hiccoughing, whimpering, sighing, audible breathing, throat sounds, vocalizing, and the hunger cry.

Head movements are a small proportion of the total motility of the newborn, constituting approximately five per cent of his activity. Body movements and leg movements are each nearly 30 per cent, arm movements are 20 per cent, and sounds approximately 15 per cent of the child's responses.⁸

Bryan⁹ observed ten infants who, when placed face down on a table, lifted the head off the table during the first twenty minutes after birth. Four of these pulled the knees forward under the body. One infant on the second day showed unusual muscular development. The knees were pulled up, the elbows pulled forward, and head raised until it was at right angles to the line of the spine, and then turned from side to side. After a few seconds the right arm was straightened so that the weight was shifted from the elbow to the right hand. Soon with a

⁸ See Irwin, *op. cit.*, pp. 20-35.

⁹ *Child Development*, vol. 1, pp. 72-75.

light push it rolled over to the left on its back. Blanton¹⁰ observed nine infants, ages two to fifteen days, who could hold up their heads from one to six seconds when held in an upright position on the examiner's lap with suitable body or back support. This, however, is quite unusual.

Much has been written about the character and meaning of the vocalizations of the newborn. Immanuel Kant, in pessimistic mood, referred to the birth cry as "a cry of wrath at the catastrophe of birth." Various observers have concluded that crying soon takes on definite meaning — within twenty-four hours, according to one writer, and somewhat later according to several others. When the infant is uncomfortable from wet clothing or from cold, is in pain, or is angry, his cries are said to show observable differentiating characteristics. Of this, however, we cannot be too sure, because investigation¹¹ has shown that adults could judge the emotional accompaniment of the cry with very little success *when they did not know the stimuli* used to evoke the cry. The newborn infant's vocalizations usually are accompanied by some overt bodily activity, such as rolling the head, opening the mouth wide, jerking, twisting, bending the body and throwing it about, slashing the arms about, and kicking with the legs.¹²

Thus the human infant spends much of the first ten days of life after birth in ceaseless activity, much of it so rapid and difficult to observe that mechanical means are necessary in order that it may be recorded. Even when asleep the infant often is active a fifth of the time, even though no external stimuli are present, and when awake he is engaged in movement as much as two-fifths of the time.¹³

Early Specific Responses. (1) Feeding movements. During the first two postnatal weeks the infant is capable of making certain specific responses which we should now consider. Sucking movements have been observed at birth or even before complete delivery. (Preyer.) They are one of the earliest reactions of the newborn infant, occurring more frequently when

¹⁰ *Op. cit.*, pp. 464-465.

¹¹ Sherman, *The Process of Human Behavior*.

¹² See Pratt, Nelson, and Sun, *op. cit.*, p. 40.

the infant is hungry. They are most readily evoked by tactile stimulation of the lips, but they may be elicited also by slight stroking or pressure upon the cheeks as well as above and below the lips. We would naturally expect the sucking response to such varied stimuli because this reaction involves the coordination of the muscles of the cheek, lips, and tongue, and the stimulation of any one of these parts might set off the total reaction. There is some disagreement in the results of investigations on this problem. In one study¹⁴ of sixty infants, feeding responses were elicited only by direct contact in the mouth or cheek region; but in another one¹⁵ the response was secured to an entirely different set of stimuli. Pinching the large toe of seventeen moderately well-fed infants 164 times resulted in their resuming the sucking movements in all cases. Pulling the hair of the infants' heads for a total of 115 times and dropping three infants a distance of four inches a total of twenty times also led them to resume the sucking movements.¹⁶ The stimulus evoking sucking movements becomes more specific as the infant grows older. Swallowing usually follows sucking movements, but infants less than two weeks old have been found to discriminate between milk and air. When sucking milk they swallowed it; when sucking air they made no swallowing movements.¹⁷

Thumb-sucking has been observed as soon as twenty minutes after birth.¹⁸ This response very commonly becomes a habit at a later age. Since thumb-sucking often follows from the infant's being hungry, proper nutrition and feeding schedules from earliest infancy should help prevent some cases of it. Furthermore, it would seem advantageous to allow the infant ample opportunity for gross-muscle activities. Suitable clothing, bed, and covers give him more range for moving about.

(2) Foot and leg movements. When the sole of an infant's

¹⁴ Ripin, *A Study of the Infant's Feeding Reactions During the First Six Months of Life*.

¹⁵ Jensen, in *Genetic Psychology Monographs*, vol. 12, pp. 361-479.

¹⁶ See Pratt, Nelson, and Sun, *op. cit.*, p. 205, see also Table 4 which shows that feeding movements may be elicited also by thermal, gustatory, and olfactory stimulations.

¹⁷ Jensen, *op. cit.*, p. 471.

¹⁸ Blanton, *op. cit.*, p. 482.

foot is stroked lightly along the median line from toes to heel, we often observe an extension or spreading of the toes, known as the *plantar reaction*. Certain features of this reaction were studied by Babinski who advanced the theory that the extension of the toes in adults is a pathological condition due to an injury to primary motor centers of the brain. The presence of the reaction in infants was ascribed to the immaturity of these same tracts. As a result of his work on this reaction, certain features of it came to be known as the Babinski reflex. The extension of the great toe upon plantar stimulation is known as the positive Babinski. It may or may not be accompanied by a spreading or flexion of the others. At the present time its appearance is not regarded as indicative of the maturation of nerve tracts.¹⁹ Many infants do not give the positive Babinski reaction upon plantar stimulation. Other specific movements (see Table 3) also are elicited by plantar stimulation as well as the extension and flexion of toes. In a study of the reactions of 96 infants,²⁰ one application of the stimulus resulted in flexion of the toes (negative Babinski) in 57.3 per cent of the cases, and in extension of the great toe (positive Babinski) in 42.7 per cent of the cases. To the infants who showed the positive response, five additional stimulations were then applied within thirty seconds, and "the summation of subliminal stimuli" resulted in a flexion response in 89.6 per cent of those cases which first gave the positive Babinski. Flexion was not followed by extension in any case in this experiment.

In another study of 100 infants²¹ during the first ten days of post-natal life, the Babinski reaction was not elicited in any case on the first day. Before applying the stimulus the infant's leg was placed across the palm of the experimenter's hand, the thumb and fore-finger clasping the leg lightly just below the knee to prevent the infant from jerking his leg away, as from tickle. Some of those showing the Babinski reflex early were retested on the eleventh and twelfth days. By this time the reaction appeared immediately upon the in-

¹⁹ See, for example, Sherman, in *Journal of Comparative Psychology*, vol. 5, pp. 56-58.

²¹ Bryan, *op. cit.*, pp. 62 ff.

fant's leg being taken in the hand, before the sole of the foot had even been touched. This raises the question whether the reaction can be elicited by stimulations of other areas than the plantar, or whether it was conditioned to other stimulations.

Plantar stimulations may evoke a wide variety of responses, as shown in Table 3.²²

TABLE 3. THE AVERAGE NUMBER OF SPECIFIC MOVEMENTS PER HUNDRED PLANTAR STIMULATIONS. N = 71 INFANTS, AGES 0 TO 17 DAYS
(From Pratt, Nelson, and Sun) *

SPECIFIC MOVEMENT	ASLEEP		AWAKE	
	Right foot	Left foot	Right foot	Left foot
Extension of toes	47	44	69	66
Flexion of toes	10	11	12	16
Flexion of foot	45	41	27	27
Extension of foot	0	3	0	1
Fanning of toes	14	13	28	34
Extension of large toe	6	9	7	4
Flexion of large toe	1	1	0	0
Extension of leg	3	2	5	6
Flexion of leg	11	13	9	7
Crossed extension of toes	5	1	7	2

* *The Behavior of the Newborn Infant*. Columbus, Ohio, State University Press, 1930. Reproduced here by special arrangement with the publishers

The *knee-jerk* or *patellar reflex* occurs upon appropriate stimulation in nearly all newborn infants.

(3) Grasping. If a small rod or a person's finger is brought into contact with the newborn infant's hand he is likely to grasp it tightly. This reaction is very common and has been observed during delivery and immediately thereafter. Sometimes immediately after birth the infant, having grasped the rod or finger, continues to hold on when the examiner raises it and supports his weight for as long as a second. Usually the infant is not able to support his own weight at birth in this manner, although he may hold tightly enough to lift his shoulders, or

²² See Richards and Irwin, *Plantar Responses in Infants and Young Children*, for results of several new experiments and a critical evaluation of previous experimental work on plantar responses.

his head and shoulders. Of course, we cannot conclude that an infant does not have this ability because he fails to support shoulders, head, or entire body at some particular time. Conditions within the infant seem to affect the results, as in one observation when a crying baby responded readily, whereas a baby that was quiet responded only with difficulty.²³ A hungry child might hold on, whereas he would let go when not hungry. A sound stimulus seemed to have a reinforcing effect. After the fourth month the grasping reflex tends to drop out and become organized into a voluntary grasping response.²⁴

(4) Locomotion during the first two weeks. A few evidences of locomotion have been observed during the first two weeks of post-natal life. Many infants when supported at the arm-pits will make walking movements.²⁵ Their whole body, however, will be flabby. The legs will flex and turn under it if weight is put upon them. Unusual cases have been reported.²⁶ In one, the infant while held in the warm bath immediately after birth to set up respiration (but before breathing was well established), "suddenly began a treading motion with its feet which was perfectly rhythmic and regularly alternating at the rate of 80 per minute," except that the left foot lost 10 beats in one minute whereas the right foot lost none. Another baby, nine days old, in being handled, was brought near a table and its feet touched it. Immediately it stiffened and bore its full weight on its feet. It even balanced itself for an instant on its feet with arms outspread and its toes "dug in" in characteristic fashion to the table. One infant on the fifth day showed unusual muscular development and coordination in creeping a few inches. Another, on the eighth day, crept forward six inches to a wall twice in one minute, the second time with its head in the air. Another infant, when placed prone and given something to push against with the feet, moved across a table (18 inches) twice on the seventh day and once each day thereafter until the tenth

²³ Bryan, *op. cit.*, p. 71.

²⁴ Cf. Blanton, *op. cit.*, p. 466; Bryan, *op. cit.*, p. 71; and Watson, *Behaviorism*.

²⁵ McGraw, in *Child Development*, vol. 3, pp. 291-297.

when it was removed from the hospital and no further observations were possible. A sixth infant showed this ability on the ninth and tenth days. All of these cases are unusual. As we shall see later, crawling, standing with help, holding head erect, and similar coordinated motor phenomena ordinarily are not found until sometime later.

(5) Vomiting. The coordination of muscles involved in this reaction is usually present at birth, and the activity may be seen very shortly thereafter.

Coordination of Arms During Early Infancy. A very simple test may be used to ascertain if an infant can coordinate his arm movements. The examiner presses on the child's chin with the finger and then observes the nature of the arm and hand reactions thereby induced. Coordinated movement is present when both of his hands touch the examiner's finger at the chin in a pushing manner. When this simple test is tried with infants a few hours after birth very diffuse reactions of the hands are

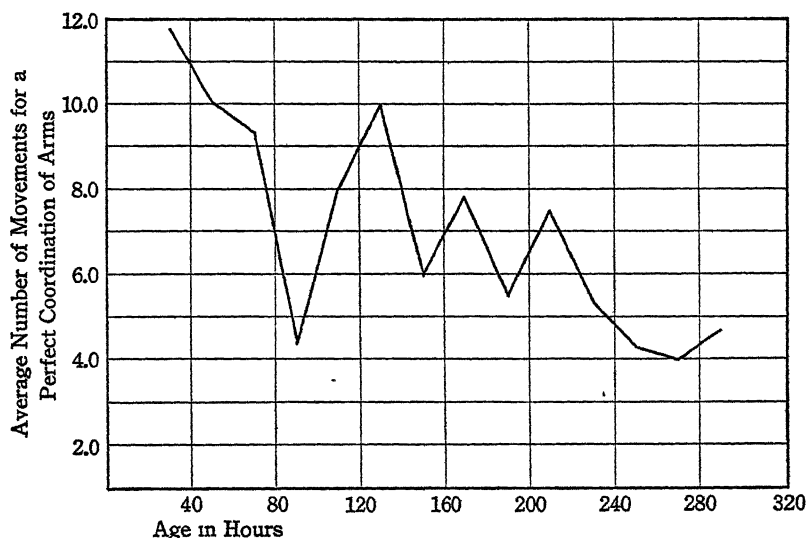


FIG. 22. DEVELOPMENT OF COORDINATION OF ARMS IN MAKING A DEFENSE REACTION TO PRESSURE ON THE CHIN, FROM BIRTH TO 300 HOURS

(Sherman and Sherman.) No infant under 21 hours made successful coordinated movements.

made. The infant's hands are thrown about in an irregular manner, occasionally striking the examiner's finger, but purely by chance. Development is rapid, but the child is not likely to make a coordinated movement until after he is 21 hours of age.²⁷ In one study, no child before the age of twelve days made a well-coordinated movement in less than four trials. The approximate course of improvement may be seen from Figure 22.

3. REACTIONS TO SENSORY STIMULATIONS

Reactions to Light. If a light of suitable strength is flashed in the eyes of a normal infant immediately after birth his eyes seem to have a fixed stare. If this is done again in about three hours, the pupils of his eyes may contract slightly but very slowly. If we repeat this at intervals of a few hours, we will find that the speed and amount of contraction increase so that by the time he is 30 hours old the reaction is prompt and adequate in amount.²⁸ After the age of thirty hours the reaction seems to be well established in all cases. The increase in the effectiveness of this reaction during the earliest hours of infancy may be seen roughly from Figure 23. During the first day or

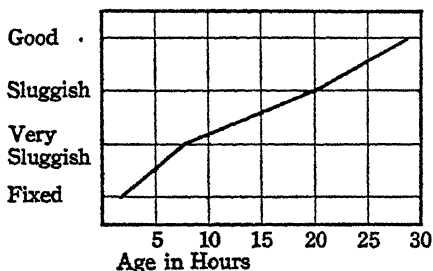


FIG. 23. ADEQUACY OF REACTION OF THE PUPIL TO LIGHT, INFANTS FROM BIRTH TO THE AGE OF 30 HOURS

(Sherman and Sherman.)

²⁷ See Sherman, *Journal of Genetic Psychology*, vol. 5, pp. 66-68.

²⁸ See the experimental work of the Shermans, in *Journal of Comparative Psychology*, their volume, *The Process of Human Behavior*.

two, prolonged stimulation often is followed by turning the head from side to side or by drawing it back away from the source of light.

Coordination of the eyes. The development of the coordination of the eyes occurs in early infancy. Sometimes the newborn infant can move each eye independently of the other, one turning in one direction at the same time that the other turns in another direction.²⁹ This lack of coordination does not last long. Very soon he coordinates the movements of the eyes in fixating a light stimulus, sometimes before the sixth hour after birth. Coordination improves very rapidly, and is likely to be almost perfect in a day and a half.³⁰

Optic nystagmus in early infancy. When an adult looks at a moving object his eyes slowly follow it or move in the direction in which it is moving. Then they make a very rapid backward movement, opposite to the direction in which the object is moving. This is known as *optic nystagmus*. Infants at a very early age show optic nystagmus upon the first presentation of the moving stimulus. One displayed this response at 11½ hours after birth, another at 1¼ hours after birth, and another, a child born one month prematurely, at 11¾ hours of age.³¹ From this it appears probable that the neural mechanisms underlying nystagmus are ready to function at birth.

Ocular pursuit of a moving object. The ability to follow a light moved horizontally develops before ability to follow one moved vertically, while the reaction of following a light moved in a circle develops still later.³² Slowly moving objects can be followed at an earlier age than rapidly moving ones. Unsuccessful pursuit eye-movements may be present a few minutes after birth.³³ By the third or fourth week some infants respond

²⁹ See Stern, *Psychology of Early Childhood*, p. 69; Blanton, in *Psychological Review*, vol. 24, pp. 456-483.

³⁰ Sherman, *Journal of Comparative Psychology*, vol. 5, p. 65, found less than half of the eye movements were coordinated before the age of six hours; at 6 hours 37.5 per cent were uncoordinated; at 10 to 34 hours of age, 13 per cent; at 50 hours, 10 per cent; at 200 hours, none.

³¹ McGinniss, in *Genetic Psychology Monographs*, vol. 8, pp. 321-430.

³² See, for example, Jones, in *Journal of Genetic Psychology*, vol. 33, pp. 537-585.

³³ See McGinniss, *op. cit.*

successfully, but all infants are not likely to do so until sometime after the sixth week.³⁴

Reactions to Sound. Does the infant hear immediately after birth? Many observers have concluded that the child does not hear at birth because the ear then is filled with a liquid. Many tests have been used to secure a reliable answer to this question. Various kinds of bells, whistles, snappers, tuning forks, and toys, as well as the human voice, have been used as stimuli. Often the sounds have been fairly loud and objects have been moved rapidly very close to the child's ear so that we cannot be sure his responses were not induced by tactile stimulation of the skin by the sudden change in the air currents rather than by auditory stimulation. Some of the studies³⁵ seem to indicate that reactions to sounds immediately after birth were unusual; that children two to six days old reacted to sounds such as the rattling of paper; that during the first ten days infants did not respond to the light ringing of a small hand bell; that some did respond to a loud ringing of a hand bell swung close to the ear but not touching it; and that high shrill tones aroused more active responses than did lower ones. Other studies³⁶ indicate that the amount of activity following auditory stimulation increased from the first to the tenth day.

More recently better techniques have been used which control the intensity, duration, and pitch of the stimuli.³⁷ Apparently the newborn infant does respond to sounds. Greater intensities seem to bring greater responses. When stimuli lasting one, three, five, and fifteen seconds were used, the

³⁴ See also Jones, *op. cit.*, pp. 537-585. By the fifty-eighth day the 365 infants studied made successful ocular pursuit eye-movements of a diffused light which was moved in the horizontal plane at the rate of two feet per second. Beasley, however, reports in *Child Development*, vol. 4, pp. 106-120, successful responses by three children who were less than 5 hours of age.

³⁵ Blanton, *op. cit.*, pp. 470-472; Bryan, *op. cit.*, pp. 56-77; Haller, in *Journal of Genetic Psychology*, vol. 40, pp. 162-180.

³⁶ Pratt, Nelson, and Sun, *op. cit.*, pp. 79-104.

³⁷ See Stubbs, *The Effect of the Factors of Duration, Intensity, and Pitch of Sound Stimuli on the Responses of Newborn Infants*; Weiss, *Differential Variations in the Amount of Activity of Newborn Infants under Continuous Light and Sound Stimulation*; or see a report on these two studies in Stoddard and Wellman, *Child Psychology*, pp.

longer the stimulus the greater the percentage of response. When the sound stimuli were continued six minutes their greatest effect appeared after two to four minutes and lasted until the end of the six minutes. Sounds at various pitches (128, 256, 1024, 4096 cycles) elicited more than 75 per cent of responses. Variations in pitch within the foregoing limits do not seem to show any consistent differences in response. Infants' responses to sound seem to depend in part upon their condition at the time. Those awake and inactive are likely to make the greatest responses, those crying respond the least, and those silent and active or asleep make an intermediate intensity of response.

A few cases have been reported in which movements of the fetus in response to a loud sound have been observed as early as a month before birth,³⁸ but we cannot be sure whether the infants responded to the auditory elements of the sound stimulations or to mechanical vibration. Certain changes in the breathing and in the pulsations of the fontanelle have been observed in infants subjected to auditory stimulations on the first day.³⁹

*Sensitivity to Taste Stimulations.*⁴⁰ As early as the second day infants show clear-cut differential reactions to salt solutions. On the first day after birth many infants make some kind of a response to a great variety of taste stimulations, citric acid, quinine, sugar, salt, and water having stimulating value in this descending order.

Responses to Olfactory Stimuli. The child at birth seems to have a poorly developed sense of smell.⁴¹ Infants under two days old reacted to 49 per cent of the olfactory stimuli used by one investigator, ammonia being the most effective. They have also failed to differentiate different kinds of milk during the first ten days after birth. Apparently smell develops more slowly in the newborn than do some of the other senses.

Reactions to Temperature. Infants seem to respond to tem-

³⁸ See Forbes and Forbes, in *Journal of Comparative Psychology*, vol. 7, pp. 353-355; Ray, in *Child Development*, vol. 3, pp. 175-177. See also p. 51 of this volume.

³⁹ Canestrini, *Über das Sinnesleben des Neugeborenen*.

⁴⁰ Pratt, Nelson, and Sun, *op. cit.*, pp. 105-124; Jensen, in *Genetic Psychology Monographs*, vol. 12, pp. 361-479.

⁴¹ Canestrini, *op. cit.*; Pratt, Nelson, and Sun, *op. cit.*, pp. 125-143; Bryan, *op. cit.*, p. 61.

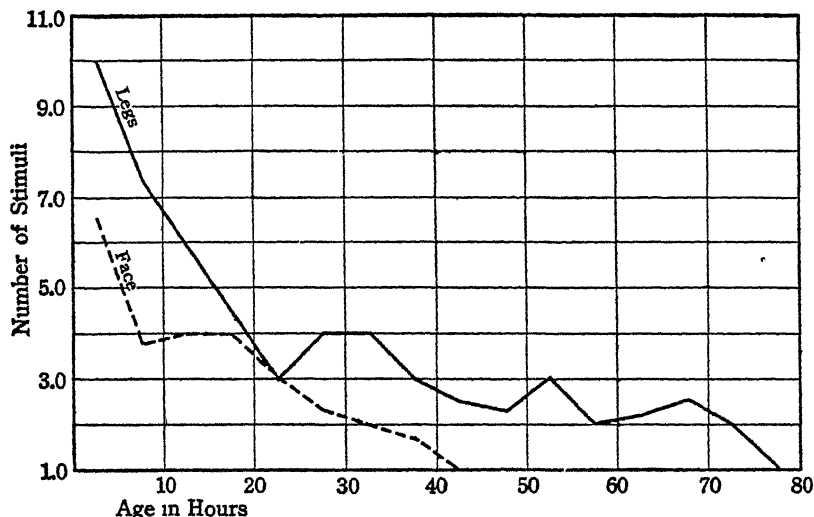


FIG. 24. RESPONSE OF INFANTS TO STICKING WITH PIN, FROM BIRTH TO THE AGE OF 80 HOURS

(Sherman and Sherman)

perature on the day of birth. If the stimuli are considerably above or below body temperature, the reactions are stronger.⁴²

Reactions to Pain Stimulation. The infant at birth or a few hours thereafter shows sensitivity to such stimulations as pricking with a needle. In investigating this response, a constant amount of pressure of the needle is applied to the cheeks, the anterior surface of the thigh, and the lateral surface of the calf of the leg. If one stimulation brings no response, additional ones are applied, but never more than ten. The face is sensitive to pain at an earlier age than is the leg and also requires fewer repetitions of the stimulus at any time during the first two days. It seems significant that pain reactions not only appear earlier in the anterior end of the body but also develop more rapidly than those in the posterior ends. After forty hours of age the infants in one study⁴³ responded to the pain stimulus upon its first application to the face; after the age of seventy-five hours they responded upon the first application of

the pain stimulus to the calf of the leg. (See Fig. 24.) The correlations between age in hours and the number of applications of the stimulus necessary to elicit a response were $-.87$ for the legs and $-.70$ for the face.

Reactions to Tactile Stimulations. The skin on all parts of the body is sensitive to touch at birth. If certain areas, such as the heel, are stroked lightly, the member is jerked away as if from tickle.⁴⁴

An infant born without a cerebrum made overt reactions to pain, pressure, contact, and cold, but not to light, smell, taste, and warmth.⁴⁵ This observation gives some indication of the relative parts played by higher brain centers and lower spinal centers under the action of various kinds of sensory stimulation.

4. SOME OTHER REACTIONS OF INFANCY

Sleep. The amount of sleep during each twenty-four hours decreases from birth until the end of the first year. According to one study,⁴⁶ 69 infants in Vienna slept nineteen hours the first month, but only twelve hours the twelfth month. (See Fig. 25.) Studies⁴⁷ in America, however, reveal that children two years old sleep more than twelve and one-half hours on the average. Children three years old

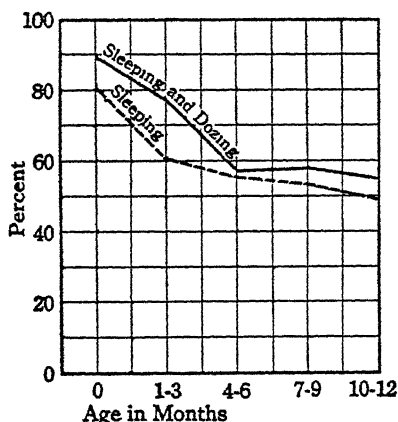


FIG. 25. PERCENTAGE OF EACH TWENTY-FOUR HOURS SPENT IN SLEEPING AND DOZING, FROM BIRTH TO AGE OF TWELVE MONTHS

(Bühler.)

⁴⁴ Bryan, *op. cit.*, pp. 62-63; Sherman and Sherman, *op. cit.*, pp. 56-57.

⁴⁵ Trommer, in *Journal für Psychologie und Neurologie*, vol. 35, pp. 194-198.

⁴⁶ See Bühler, *The First Year of Life*, pp. 111-148.

⁴⁷ See, for example, Chant and Blatz, in *Genetic Psychology Monographs*, vol. 4, pp. 13-43; Foster, Goodenough, and Anderson, in *Journal of Genetic Psychology*, vol. 35, pp. 201-217; Reynolds and Mallay, in *Journal of Genetic Psychology*, vol. 43, pp. 322-351; Wagner, in *Journal of Genetic Psychology*, vol. 42, pp. 442-459.

sleep from eleven to twelve and one-half hours, and children four years old sleep from nearly eleven to approximately twelve hours. The length of single sleeping periods increases during

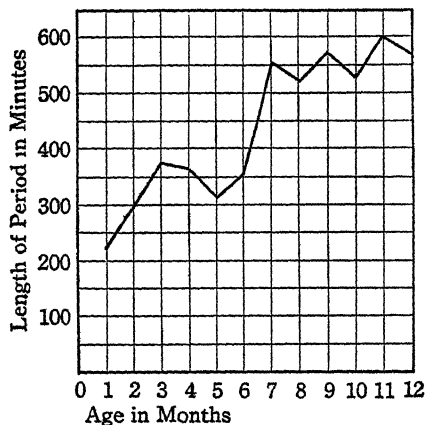


FIG. 26. LONGEST PERIOD OF UNBROKEN SLEEP, FROM BIRTH TO AGE OF TWELVE MONTHS

(Bühler.)

the first year, the longest periods of unbroken sleep often being less than four hours from birth until the age of one month.⁴⁸ By the third month, however, a baby often sleeps without waking for six hours, and by the seventh month or later he may sleep continuously nine or ten hours. (See Fig. 26.)

Smiling and Laughing.

We forego all reference to the romantic literature which purports to show the causes and meaning of the baby's laughter and smiles.

Psychologists are interested in the age at which smiles and laughter first appear, the stimuli for such responses, and the differences between the smiles of early infancy and those at later ages. Experimental work indicates that the infant usually can be stimulated to smile as early as the eighth week, and to laugh as early as the twelfth week.⁴⁹ Observers, however, have reported occasional instances of smiling as early as the first, third, fifth, sixth, or fifteenth day, and laughter on the fifth or nineteenth day. An infant four days old smiled while feeding,⁵⁰ another, seven days old, smiled at the end of bottle feeding. Another infant, thirteen days old, smiled at a bright light; while still another case, twenty-eight days old, is

⁴⁸ Bühler, *op. cit.*, p. III.

⁴⁹ See Washburn, in *Genetic Psychology Monographs*, vol. 6, pp. 397-537. See especially p. 496, for a summary of earlier work on this problem.

reported to have smiled while feeding. Infants one, two, four, and six days old have been observed to smile slightly to a tickling touch under the chin when awake and comfortable. Early smiling (without specific stimulation) is usually ascribed to a state of euphoria or general well-being. On the whole, spontaneous smiles are rare during earliest infancy. The number of laughing responses may not increase very much from the fifth to the twelfth month (Washburn) but the number of smiling responses may do so. The following characteristic differences have been observed in the smiling responses from the twelfth to the fifty-second week:²

Twelve weeks.

- Twitching of lips and other facial muscles preceding smiling.
- Round, open mouth.
- Protrusion of chin (incidence and degree decreasing up to 40 weeks).
- Vocalizations monosyllabic — “ah” (decreasing up to 40 weeks).
- Hands are moved up and down over center of body and come to rest in the mouth region.
- Knees are drawn up toward the abdomen, with rolling of body.
- Mobilized attention with reduction of bodily activity precedes smiling (decreasing up to 44 weeks).

Thirty-two weeks.

- Retraction displaces “opening” of the mouth with consequently greater bulging and raising of cheeks.
- Horizontally elliptical mouth most typical.
- Tongue protrusion at its height.
- Exposure of gums begins.
- Eyes often half-closed rather than narrowed slightly.
- Chin drawn in to neck.
- Vocalization — prolonged “ah.” Varied jargon-like sounds.

Fifty-two weeks.

- Greater effect of “control” in the above forms of behavior; less bodily activity.
- More individualization in subjects’ smiles.
- Teeth almost invariably seen.
- Double naso-labial fold first seen.

² Washburn, R. W., A Study of the Smiling and Laughing of Infants in the First Year of Life. *Genet. Psychol. Monog.*, 1929, vol. 6, pp. 527-528.

Emotional Reactions in Infancy. In addition to the milder forms of response so far considered, it is possible to elicit from even quite young infants muscular responses of much greater intensity, accompanied by marked visceral reactions, that are universally designated as *emotional*. When subjected to certain forms of stimulation, the infant will start, catch his breath, clutch his hands, pucker his lips, scream, cry, and sometimes kick and struggle. The inner components of this response usually include changes in heart beat, in blood pressure, and in the action of the digestive system.

This very intense, and often annoying, form of behavior has been the subject of a great amount of research with infants and children. At present there is no perfect agreement among psychologists on the number and kinds of emotions shown by children, or on any list of stimuli that will dependably arouse this mode of response in all youngsters. In general, it is agreed that the emotional behavior of young infants is diffused and non-specific, since definite patterns of "fear," "rage," etc., cannot be distinguished clearly. The stimuli for emotion seem to be characterized by intensity, suddenness, and unaccustomedness.

A blunder that must be avoided in all child psychology, and especially in relation to emotional responses, is that of assuming that infant behavior has the same meaning for the infant as similar behavior has for the adult. Adults are quite prone to read into an infant's tantrum the significance that this reaction would have for an older person. Such interpretations of infant emotion have little value. In the first place, it is shown later that even experienced adults are unskillful in detecting the stimuli that have caused certain observed infantile reactions. They cannot, therefore, judge or discriminate the various forms of infant emotions. A second objection is to the practice of ascribing introspectively designated emotions to infants. It is impossible to know just how the infant feels, and to interpret his mental state in adult terms is unreliable.

emotion in childhood, two chapters are devoted to this topic later. A more detailed discussion may be deferred to these sections.

5. DIFFUSE AND SPECIFIC REACTIONS DURING EARLY INFANCY

Probably the most significant result of recent experimental studies of the behavior of very young infants is the accumulating mass of evidence showing the extent of diffuse movements or responses under various specific sorts of stimulations. Reference has already been made to this approach, and some specific data may now be presented.

Diffuse Movements Under Specific Sensory Stimulation. If specific sensory stimuli are applied to infants during the first two weeks of postnatal life, their reactions are not confined to the particular organ or segment to which the stimulus presumably has been applied. Responses of the particular segment do occur, but also movements or reactions involving more distant parts of the body. Thus responses to light during the first two weeks after birth include not only contraction and dilation of the pupils and other responses as described in a preceding section, but also movements of other parts of the body, such as head, trunk, arms, and legs. Two-thirds of the responses to light are likely to involve movements of the eyes,⁵² which is to be expected; but one-third of them involve movements of bodily segments not directly related to the stimulus. By the end of two weeks the amount of general bodily activity resulting from stimulation by light is very much reduced. When stimulated by a loud sound during the first two or three weeks of postnatal life, infants are likely to make a variety of responses. In one study nearly one-third of these were arm and leg movements; one-third were eye movements; one-fourth were general bodily movements; and a small percentage consisted of facial and head movements. Reactions to sound seemed to be no more specific for this type of stimulus than for others, since 36

⁵² Pratt, Nelson, and Sun, *op. cit.*

per cent of the responses were of the head region and 64 per cent were of other parts of the body. Similarly, responses to taste and temperature stimuli during this early period show a wide variety of segmental responses, rather than being limited to specific reactions of the particular part of the body stimulated. These facts are shown in Table 4.

TABLE 4. PERCENTAGE OF ACTIVITIES OF NEWBORN INFANTS WHICH ARE SPECIFIC REACTIONS TO SPECIAL SENSORY STIMULATIONS

(From Pratt, Nelson, and Sun)

	KINDS OF SENSORY STIMULATIONS				
	Light	Sound	Taste	Smell	Temperature
General body movements	11	26	12	28	19
Movements of extremities	11	35	9	26	19
Head movements	9	1	6	13	13
Sounds		3	4	10	4
Sucking reactions			19	5	23
Facial movements	1	1	21	9	12
Mouth movements (exclusive of sucking)	1		28	3	8
Eye movements	67	34	1	6	2
Total per cent	100	100	100	100	100

The Significance of Mass Activity. From the experimental results that have just been presented, it appears that specific reflexes to definite stimuli are *not* the final elementary units from which all of the other more complex behavior of the human being is compounded. It is now clear that infant behavior of the diffuse or mass sort is an earlier type, from which more specific modes of response gradually become differentiated.

This discovery is sometimes known as the *organismic hypothesis*. It is ably presented by Irwin, as follows:

The organismic hypothesis on the structural side assumes that the organism differentiates into cells, tissues, organs, and structures, all the time maintaining its integrity. The various zoological sciences afford a large and convincing body of evidence for the hypothesis. Turning to the behavior side of the problem,

patterns differentiate from a primitive general matrix of behavior called mass activity. Mass activity is at its maximum during the first fetal months, and during uterine existence the differentiation of activity into patterns is under way. After birth the processes of differentiation proceed with increasing degrees of specificity, definiteness, and preciseness of pattern until they attain the degree of maturity which we recognize in the adaptive behavior of the organism. However, the fact should be emphasized that experimental evidence for an organismic view from studies on human behavior is only beginning to accumulate.⁵³

Another interesting confirmation of the precedence of diffuse over specific response comes from the studies of the conditioned reaction. Pavlov concludes, "The study of conditioned reflexes has shown, however, that a conditioned reflex appears at first in a generalized form, that is, that excitation irradiates from its point of initiation to embrace also cells belonging to other receptor elements beyond the boundary of the area of the cortex primarily connected with the stimulated receptor."⁵⁴

Newborn infants show, therefore, (1) an amount of mass activity or general diffuse movements which seem to be caused by impulses irradiating throughout the body. During the period of early infancy, these give way to (2) an increasing number of specific and adaptive responses emerging from the former mass activity. This process of differentiation is a continuation of the line of development begun before birth and extensively described in the two preceding chapters. The maturation of inherited structures and the influences of environmental stimulation both contribute to the process by which the newborn infant becomes the child.

⁵³ *Psychological Review*, vol. 39, p. 392. Quoted by special arrangement with the Psychological Review Company, publishers. See also his more recent discussion in *Psychological Review*, vol. 40, pp. 467-477, in which supporting evidence from anatomy and zoology is presented.

⁵⁴ *Conditioned Reflexes*, p. 220. Cf. also the work of Minkowski (*Revue Neurologique*, vol. 37, pp. 1105-1235) and Mohr and Bartelme (*American Journal of Diseases of Children*, vol. 40, pp. 1000-1015) for data on human fetuses two to five months old, delivered by Cæsarean operation. Younger fetuses showed fewer specific reactions and more diffuse or non-specific responses to various stimuli than did the older fetuses.

SELECTED REFERENCES

Buhler, in *The First Year of Life*, reports observations of infants' positive and negative reactions (chaps. 3-5) and their sleep and dozing (chap. 8), Gesell, in *Infancy and Human Growth*, sections 1-4 of chap. 5, and sections 1-4 of chap. 6, gives normative data for infants one to four months old; Irwin, in *Genetic Psychology Monographs*, vol. 8 (1930), pp. 1-92, reports on extensive experimental studies of the behavior of infants during the first two weeks of postnatal life; Pratt, in chap. 3, *Handbook of Child Psychology* (revised edition, edited by Murchison), also discusses the behavior of the newborn and gives a bibliography of 188 titles to 1932; Sherman and Sherman, in *The Process of Human Behavior*, chap. 3, give an account of "the first human responses"; Shirley, in *The First Two Years*, chap. 3 of vol. 1, "Postural and Locomotor Development," and chap. 2 of vol. 2, "Intellectual Development," presents the results of extensive studies of the behavior of twenty-five babies under two years of age. See also studies by Irwin on infant behavior reported in *Journal of Comparative Psychology*, vol. 14 (1932), pp. 415-428, in *Child Development*, vol. 3 (1932), pp. 104-107, and in *Psychological Review*, vol. 40 (1933), pp. 467-477; and by Jones, in *Journal of Genetic Psychology*, vol. 33 (1926), pp. 537-585.

See additional references at the end of this volume.

CHAPTER V

GROWTH IN BODILY SIZE

IT is impossible to make an adequate study of the development of behavior and function in childhood without considering the growth of the structures of the body. Structure and function have important interrelationships, which can be seen only by studying them in close proximity. The present chapter describes the growth in bodily size and in relative proportions of parts of the body from early infancy to the age of twelve years. The next chapter traces the development of the most basic of simple functions, the physical and motor capacities.

I. SOURCES OF DATA ON BODILY GROWTH

Repeated vs. Single Measurements. Data on child growth and development are derived from two sources, (1) from repeated measurements on the same individuals at different ages (retests or "seriatim" measurements), and (2) from single sets of measurements on many different individuals of each age. Retest data are more difficult to compile and are not available on nearly as many individuals as are single sets of measurements. The repeated measurements are more reliable, however, for they show each individual's actual growth, and individual growth curves can be plotted from them. Such curves can then be studied and compared to discover elements or patterns of growth common to many individuals. From them alone can we really know the course of growth and development during childhood. Even combining the growth records of many individuals may be misleading, since the resulting composite curves may conceal actual trends. Taking an average of single measurements of many children of each age (for example 1000 two-year-olds, 1000 three-year-olds, etc.) gives an even less accurate knowledge of growth or developmental changes in-

cident to age, because from such facts we cannot know the actual growth of any individual.² Such a generalized or average curve, however, does give a certain general picture of growth which has some value.

2. GROWTH IN HEIGHT²

Height of the Newborn. Although a great amount of work has been done on the growth of the child from birth to maturity, birth weight rather than birth height has been measured more commonly, because it is more significant for nutrition during infancy. The small amount of information available, however, indicates that children vary in height at birth and that boys are usually taller than girls, although numerous exceptions occur. The average height of both sexes is around 20.5 inches (52 to 53 centimeters). It also varies according to race and parentage.

Growth in Height. Standing height, or stature, increases rapidly during the pre-school years, usually doubling by the age of five years. Growth is particularly rapid from birth to the age of two. In fact, the actual increments of growth are usually greater the first two years than during any other like period of childhood. After the age of two years, growth tends to be regular, as can be seen in Figures 28 and 29. Boys, on

² Merrell has shown (in the case of rabbits) that the true growth curve of an individual cannot be determined from a composite curve formed by averaging the measurements of many different individuals of different ages; it is best determined by repeated measurements on the same individual. See *Human Biology*, vol. 3, pp. 37-70.

² For data on growth in length of the body and its various parts see the following: Baldwin, in *Genetic Studies of Genius*, vol. 1, pp. 135-171; Baldwin, *Physical Growth of Children from Birth to Maturity*; Bean, in *American Journal of Physical Anthropology*, vol. 15, pp. 355-419; Boynton, *The Physical Growth of Girls*, Davenport, in *Journal of General Physiology*, vol. 10, pp. 205-216, and in *American Journal of Physical Anthropology*, vol. 9, pp. 205-232; Gray and Ayres, *Growth in Private School Children*; Meredith, *The Rhythm of Physical Growth*; Reports of Iowa Child Welfare Research Station, in *American Journal of Diseases of Children*, vol. 38, pp. 541-546, and vol. 42, pp. 1137-1143; Scammon, chap. 4 in Harris et al., *The Measurement of Man*, Wallis, *How Children Grow*; Wilson et al., *The Merrill-Palmer Standards of Physical and Mental Growth*; Woodbury, *Statures and Weights of Children under Six Years of Age* (or see his summary in *American Journal of Physical Anthropology*, vol. 5, pp. 5-16). For some of the important earlier work on school children see Boas, in *Report of U.S. Commissioner of Education*, vol. 2, pp. 1541-1599, especially pp. 1555-1556; and Burk, in *American Journal of Psychology*, vol. 9, pp. 253-326.

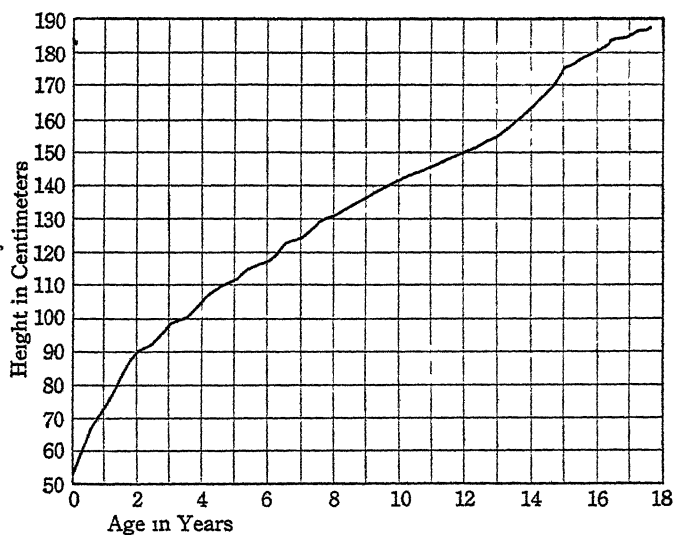


FIG 27. HEIGHT, AT SUCCESSIVE AGES, OF A FRENCH BOY, BORN
APRIL 11, 1759

Nearly all measurements taken at six months' intervals. (Scammon)

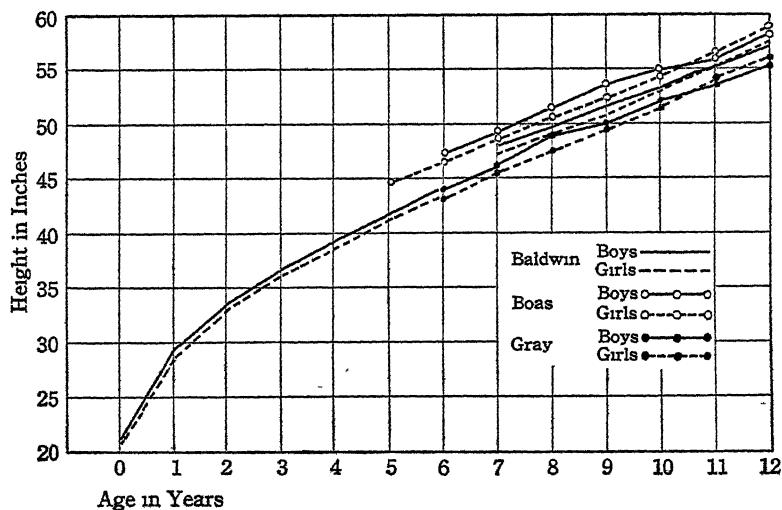


FIG. 28. HEIGHT FROM BIRTH TO TWELVE YEARS

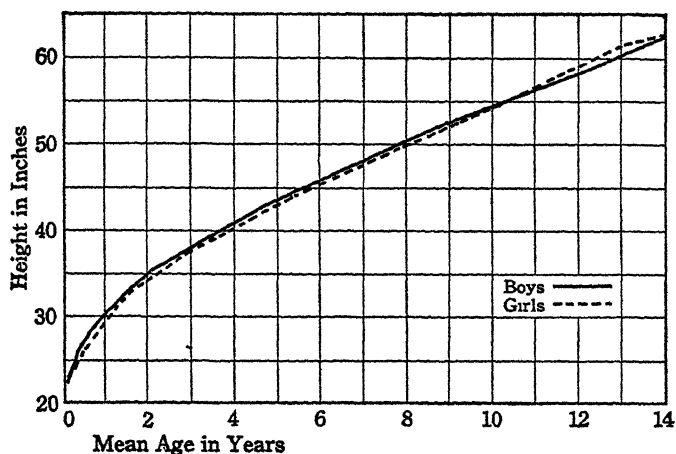


FIG. 29. HEIGHT OF IOWA CITY WHITE BOYS AND GIRLS, AGES THREE MONTHS TO FOURTEEN YEARS
(Meredith, Boynton.)

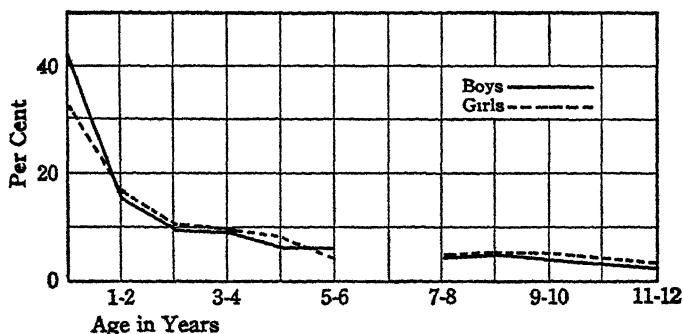


FIG. 30. ANNUAL PERCENTAGE GAIN IN HEIGHT
(Baldwin.)

the average, are slightly taller than girls until they are eleven or twelve years of age.

Another important way to study growth is to express the increment of growth for each year as a percentage of the amount at the beginning of that year. This is a significant measure of

the beginning of the period, showing comparative growth in relation to absolute size. It shows that proportion of itself which the organism increases during a given time. In a very real sense the child who grows in height from 30 to 36 inches has grown more than one who grows from 60 to 66 inches, because he has increased his stature twenty per cent, whereas the latter child has grown only ten per cent.

The percentage rate of growth in total stature is much greater during the earlier years of childhood than later. It usually is from thirty to forty per cent during the first year after birth. Thereafter, it drops sharply and is not likely to exceed five or six per cent annually from the sixth to the twelfth years, as is shown by Figure 30.

Growth in Sitting Height. Sitting height or stem length increases more rapidly during the first two years than thereafter, as shown in Figure 31. Boys usually exceed girls in this measurement. Growth curves indicate that sitting height increases less rapidly than standing height or total stature. This can be

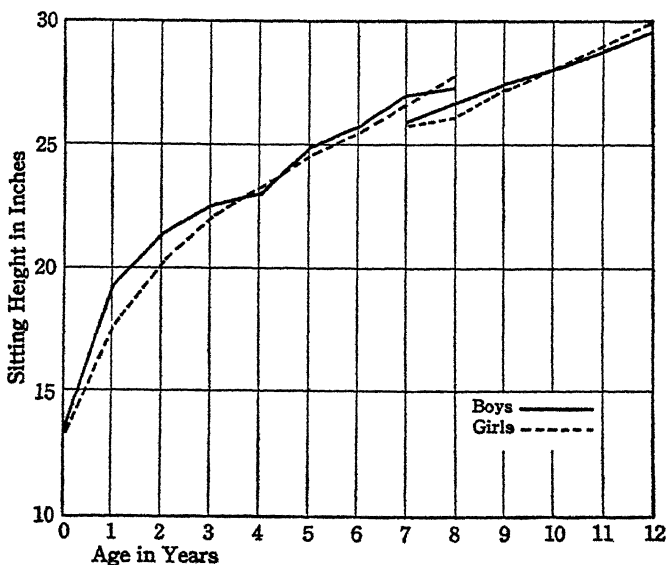


FIG. 31. GROWTH IN SITTING HEIGHT FROM BIRTH TO TWELVE YEARS
(Data combined from Scammon, Wallis, and Baldwin.)

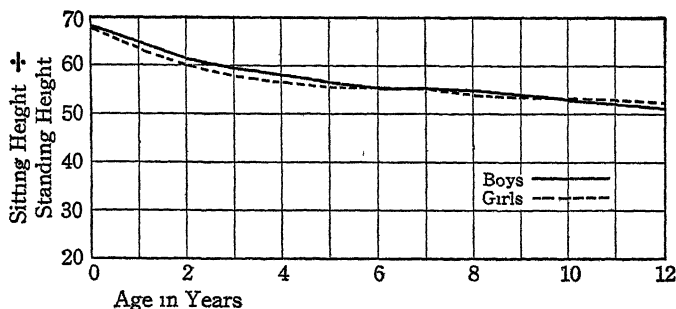


FIG. 32. RATIO OF SITTING HEIGHT TO STANDING HEIGHT FROM BIRTH TO TWELVE YEARS

(Data combined from Scammon, Wallis, and Baldwin.)

seen best from the curves of Figure 32 which show the ratio of sitting height to total stature at each age from birth to twelve years. At birth stem length is approximately two-thirds of the total length, but by the age of twelve it is only a little more than one-half. This decrease means, of course, that the head and trunk are growing more slowly during these years than the lower extremities, as we see presently.

3. WEIGHT³

Weight of the Newborn. The average child at birth weighs from six to eight pounds. Boys usually are heavier than girls. Those prematurely born are lighter than full-term infants, as would be expected.

Weight from Birth to Twelve Years. The child's weight increases very rapidly during the first twelve months, and then more slowly during the next twelve years. During the earlier part of childhood, up to the age of nine or ten years, the average boy is heavier than the average girl of the same age, although the amount of individual variation in each sex is much greater than

³ For data on bodily weight from birth to twelve see the references on height in the preceding section, and also the following. Hammett, in *American Journal of Physiology*, vol. 45, pp. 396-405. Ramsey and Alley, in *American Journal of Diseases of Children*, vol. 15, pp. 408-412; and Taylor, in *American Journal of Diseases of Children*, vol. 17,

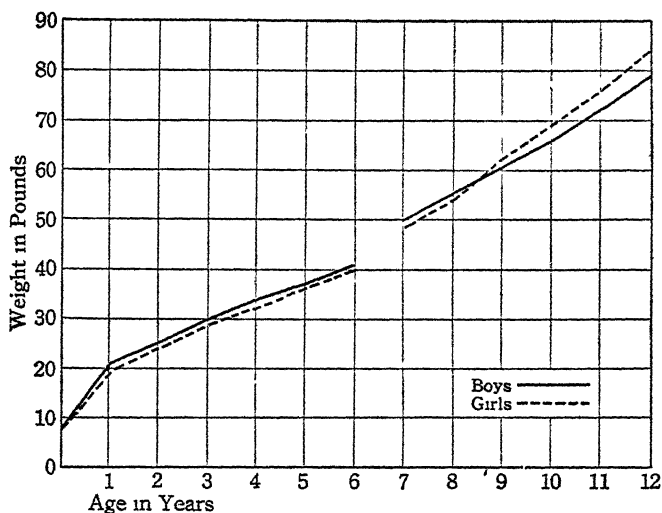


FIG. 33 WEIGHT FROM BIRTH TO SIX YEARS AND FROM SEVEN TO TWELVE YEARS
(Baldwin)

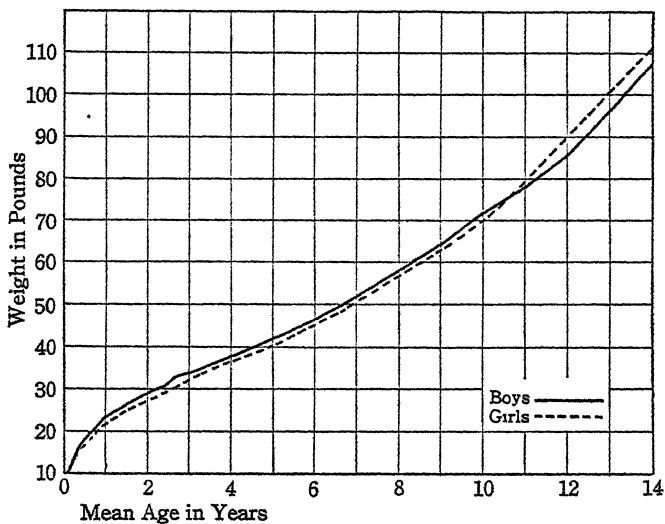


FIG. 34. WEIGHT OF IOWA CITY WHITE BOYS AND GIRLS, AGES THREE MONTHS TO FOURTEEN YEARS
(Meredith, Boynton.)

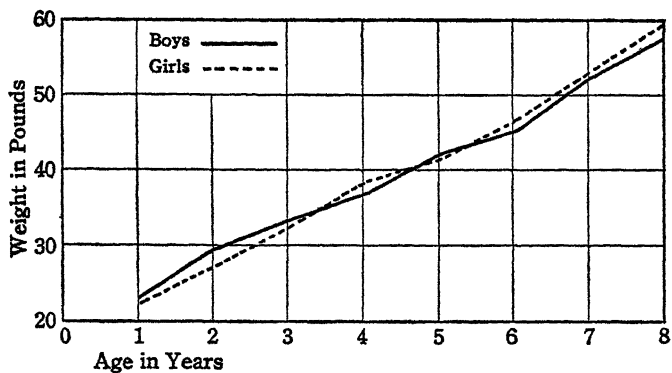


FIG. 35. WEIGHT OF NEW YORK PRIVATE SCHOOL CHILDREN, AGES ONE TO EIGHT YEARS
(Wallis.)

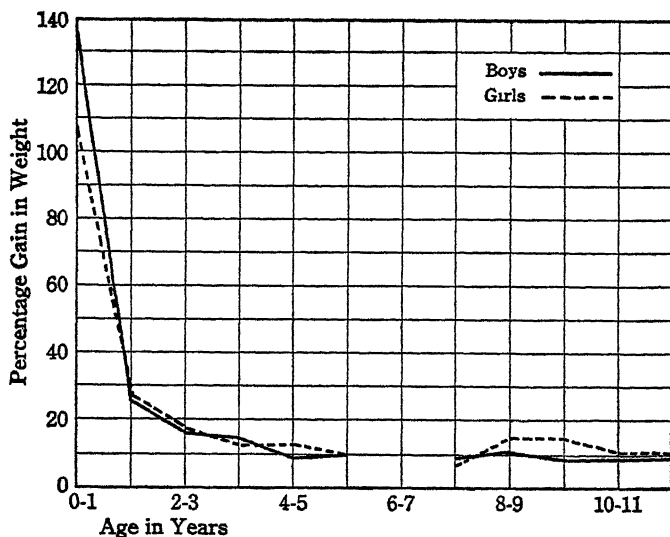


FIG. 36. YEARLY PERCENTAGE GAIN IN WEIGHT
(Baldwin.)

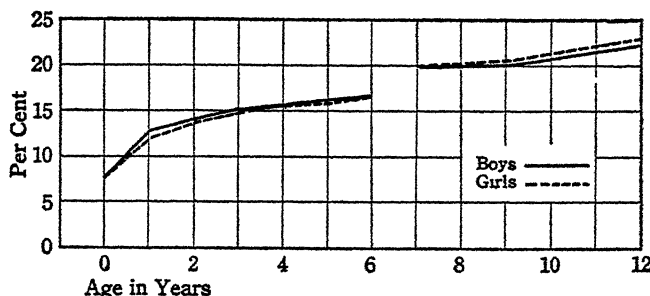


FIG. 37. WEIGHT-HEIGHT INDEX (METRIC) FROM BIRTH TO SIX AND FROM SEVEN TO TWELVE YEARS
(Baldwin.)

the difference between the sexes. In the remaining few years before puberty, girls have a greater average weight than do boys. These facts are clearly seen in Figures 33, 34, and 35.

Figure 36 shows the changes in the rate of increase of weight. Weight more than doubles during the first year, but from age five to age eleven, the increase is only a little greater than ten per cent each year. Weight is influenced by many other factors than age, varying according to race, parentage, and nutrition. Private school boys and girls have been shown usually to be taller and heavier than the general population of the same ages. As Figure 37 indicates, weight increases more rapidly than height.

Height and Weight Tables. Since height and weight are intimately related, tables of normal heights or of normal weights for various ages are of little value unless these variables are considered together. Table 5 and Table 6 represent a compilation of data for boys and girls, respectively. The figures given by the tables are the average weights of a large number of children of various ages and heights. In applying them to practical uses, it must be kept in mind that many healthy children are above and below these norms. Then, too, many important factors such as nationality and familial physical habitus (tall-thin; short-stout, etc.), cannot be taken into account in such a simple representation.

TABLE 5. WEIGHT-HEIGHT-AGE TABLE FOR BOYS
(Baldwin-Wood)

1	3	6	9	12	18	24	30	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
20	8																						
21	9	10																					
22	10	11																					
23	11	12	13																				
24	12	13	14																				
25	13	14	15	16																			
26	15	17	17	18																			
27	16	18	18	19																			
28		19	19	20	20																		
29		-20	21	21	21																		
30		22	22	22	22	22																	
31		23	23	23	23	24																	
32		24	24	24	25	25																	
33			26	26	26	26	26																
34				27	27	27	27																
35					29	29	29	29															
36					30	30	31	31															
37					32	32	32	32	32														
38						33	33	33	34														
39							35	35	35														
40							36	36	36														
41								38	38	38		38											
42								39	39	39		39	39										
43								41	41	41		41	41										
44									43	43		44	44										
45									45	45		46	46										
46									47	48		48	48	48									
47									49	50		50	50	50	50								
48										52		53	53	53	53								
49										55		55	55	55	55	55							

TABLE 5 WEIGHT-HEIGHT-AGE TABLE FOR BOYS (continued)
(Baldwin-Wood) *

Нт., In	1 mo.	3 mos.	6 mos.	9 mos.	12 mos.	18 mos.	24 mos.	30 mos.	3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15 yrs.	16 yrs.	17 yrs.	18 yrs.	19 yrs.
50												57	58	58	58	58	58	58							
51													61	61	61	61	61	61							
52													63	64	64	64	64	64	64						
53													66	67	67	67	67	68	68						
54													70	70	70	70	70	71	71	72					
55													72	72	72	73	73	74	74	74					
56													75		76	77	77	77	78	78	80				
57															79	80	81	81	82	83	83				
58															83	84	84	85	85	86	87				
59																87	88	89	89	90	90	90			
60																91	92	92	93	94	95	96			
61																	95	96	97	99	100	103	106		
62																	100	101	102	103	104	107	111	116	
63																	105	106	107	108	110	113	118	123	127
64																		109	111	113	115	117	121	126	130
65																		114	117	118	120	122	127	131	134
66																		119	122	125	128	132	136	139	142
67																		124	128	130	134	136	139	142	147
68																			134	137	141	143	147	149	152
69																			137	139	143	146	149	152	155
70																			143	144	145	148	151	155	158
71																			148	150	151	152	154	159	163
72																				153	155	156	158	163	167
73																				157	160	162	164	167	171
74																					160	164	168	170	171

Weight is stated to the nearest pound, height to the nearest inch, age to the nearest birthday.

Up to and including 34 inches the weights are net. Above this the following amounts have been added for clothing (shoes, coats, and sweaters not included): 35 to 39 inches, $1\frac{1}{4}$ pounds, 40 to 44 inches, $1\frac{1}{2}$ pounds, 45 to 49 inches, 1½ pounds, 50 to 74 inches, 4 per cent.

* Reprinted by special arrangement with the publisher, the American Public Health Association, New York

TABLE 6. WEIGHT-HEIGHT-AGE TABLE FOR GIRLS
(Baldwin-Wood)

TABLE 6. WEIGHT-HEIGHT-AGE TABLE FOR GIRLS (continued)

(Baldwin-Wood)

Ht., in.	1 mo.	3 mos.	6 mos.	9 mos.	12 mos.	18 mos.	24 mos.	30 mos.	3 yrs.	4 yrs.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15 yrs.	16 yrs.	17 yrs.	18 yrs.
50												56	56	57	58	59	61	62						
51												59	59	60	61	61	63	65						
52												63	64	64	64	65	67							
53												66	67	67	68	68	69	71						
54													69	70	70	71	71	73						
55													72	74	74	74	75	77	78					
56													76	78	78	81	83							
57													80			82	82	84	88					
58																84	86	86	88	93	96	101		
59																87	90	90	92	96	100	103	104	
60															91	95	95	97	101	105	108	109	111	
61																99	100	101	105	108	112	113	116	
62																	104	105	106	109	113	115	117	118
63																	110	110	112	116	117	119	120	120
64																		114	115	117	119	120	122	123
65																		118	120	121	122	123	125	126
66																			124	124	125	128	129	130
67																			128	130	131	133	133	135
68																			131	133	135	136	138	138
69																				135	137	138	140	142
70																				136	138	140	142	144
71																				138	140	142	144	145

Weight is stated to the nearest pound, height to the nearest inch, age to the nearest birthday.

Up to and including 34 inches the weights are net. Above this the following amounts have been added for clothing (shoes, coats, and sweaters not included): 35 to 39 inches, 1 pound; 40 to 44 inches, 1½ pounds, 45 to 49 inches, 1¾ pounds, 50 to 71 inches, 3 per cent.

4. GROWTH OF THE HEAD, TRUNK, AND
EXTREMITIES

The Head. The head grows more slowly during childhood than do many other parts of the body, for it has to grow less to achieve adult size. As we have already seen, the head constitutes a larger proportion of the body at birth than at any time thereafter. If we could find an adult whose head was relatively as large as it was at birth, that is, if it formed the same proportion of his total body height as it does of that of the newborn, the adult would seem to be a monstrosity, his head would be so huge. Head height at birth constitutes approximately 22 per cent of total height. If this proportion remained constant, the man five feet ten inches tall would have a head fifteen inches high, approximately one and two-thirds times as large as that which usually is found. Accordingly, the rate of growth of the head is much slower than that of total stature, total weight, or length of arms and legs. From the first to the eighth year, the head increases in length approximately 15 per cent, and in breadth 10 per cent.⁴ During this time the head loses some of its early roundness and becomes longer in proportion to width, that is, the cephalic index tends to decrease. At one month the circumference of the head is approximately two-thirds of that at three years.⁵ At six years the head girth is approximately 90 per cent of adult size, by twelve it is approximately 95 per cent. (See Figure 38.) After age six, its growth is very slow indeed as compared with the increase of the entire body in height and weight. During the first three years the child's stature increases almost 80 per cent and his total weight more than 200 per cent. Before he is six years old his height has doubled and his weight is five times birth weight. During the next six years height increases to two and three-fourths that at birth, and weight to approximately ten times that at birth. Total stature at birth is approximately four and one-half times head

⁴ See Wallis, *op. cit.*, p. 66.

⁵ See *American Journal of Diseases of Children*, vol. 42, pp. 1138-1141, for measure-

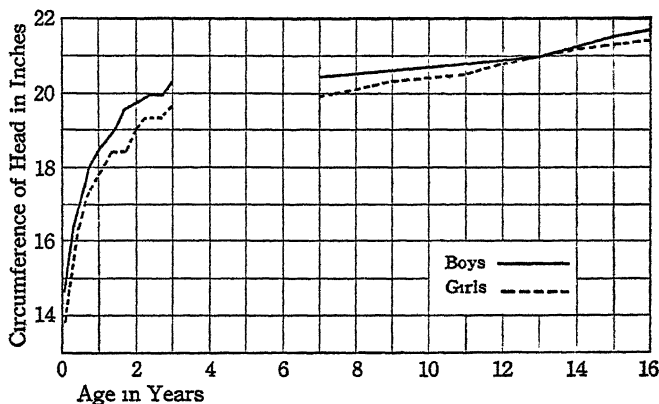


FIG. 38. CIRCUMFERENCE OF HEAD AT VARIOUS AGES

(One month to three years, Iowa Child Welfare Research Station data; seven to sixteen years, MacDonald's data.)

height; at five or six years, five times; at ten, more than six times; at fifteen and thereafter, more than seven times. From birth to maturity the height of the child's head doubles, but his total stature at maturity is three and one-half times that at birth.

Boys' head dimensions are greater than those of girls at all of these ages, and so are the average width and height of their faces.

*The Trunk.*⁶ At birth the trunk as well as the head forms a larger part of total stature than at any later time. By the age of six or seven trunk length and width are often twice as great as at birth. Between the ages of six and twelve, these two dimensions increase about half as much as during the first six years. At maturity, the trunk usually is approximately three times as long and wide as at birth, and not quite two and one-half times as thick (diameter from front to back). Trunk size is, as we would expect, closely related to stature⁷ and weight.

⁶ See Baldwin, *Physical Growth of Children from Birth to Maturity*; Gray and Ayres, *Growth in Private School Children*; Report from Iowa Child Welfare Research Station, in *American Journal of Diseases of Children*, vol. 42, pp. 1138-1141; Wallis, *How Children Grow*.

⁷ Wallis, *op. cit.*, p. 42, found correlations averaging .60 to .65 between (a) trunk length and (b) stature minus trunk length. Leg length and stature, however, were even more closely related, the correlations being .87 and .70, for boys and girls, respectively.

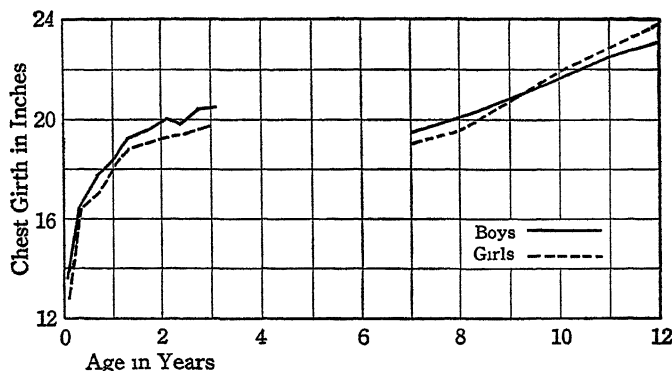


FIG. 39. CHEST GIRTH AT CERTAIN AGES DURING CHILDHOOD

(One month to three years, Iowa Child Welfare Research Station; seven years to twelve years, Baldwin.)

The mean chest girth at birth is slightly less than twelve inches. By the age of three it averages approximately twenty inches. It, too, increases more rapidly at the earlier ages, as is shown by Figure 39.

The Extremities. From the age of two years until the age of eight the child's upper arm, forearm, and hand grow at a fairly uniform rate.⁸ From birth to the age of two these measurements increase about sixty to seventy-five per cent. At eight years of age they are nearly fifty per cent longer than at two years. The lower extremities grow approximately forty per cent during the first two years of postnatal life, and nearly fifty per cent during the next six. During this latter time the trunk increases less than thirty per cent in length. At birth the ratio of arm length to leg length is greater than at any time thereafter.⁹ The ratio decreases rapidly from two to six and then slowly until twelve. After thirteen it increases slightly and remains constant thereafter. Although the arm-leg ratio becomes smaller during childhood, that is, although the arm does not grow as rapidly as the leg, yet it does grow faster than the trunk. The growth of the arms and legs again illustrates

⁸ Wallis, *op. cit.*, pp. 45-54.

⁹ Scammon and Calkins, *Growth of the Human Body in the Fetal Period*; Wallis, in *American Journal of Physical Anthropology*, vol. 16, pp. 171-191.

the law of developmental direction to which reference is made in describing fetal development. The peripheral parts of the body develop later than do the central, or trunk, portions.

The annual growth of the legs is greater than that of the arms between the ages of two and eleven in the case of girls, and between two and thirteen in the case of boys. Boys and girls, whether tall, average, or short in stature, show some differences in the proportions of parts at all ages of childhood.

5. OSSIFICATION AND DENTITION

The child's stage of development may be indicated in many ways. A feature of physiological age such as pubescence, pre-pubescence, or post-pubescence may be used. Chronological age is, of course, a most convenient index. Two other important and often utilized criteria or measures of physical development are (1) the extent to which his bones have ossified, and (2) the number of permanent teeth which have erupted (broken through the gums).

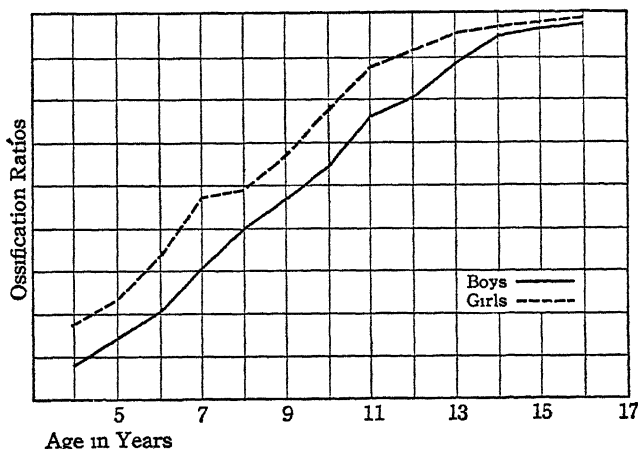


FIG. 40. OSSIFICATION RATIOS OF CARPAL BONES, AGES FIVE TO SEVENTEEN YEARS

(Freeman and Carter.)

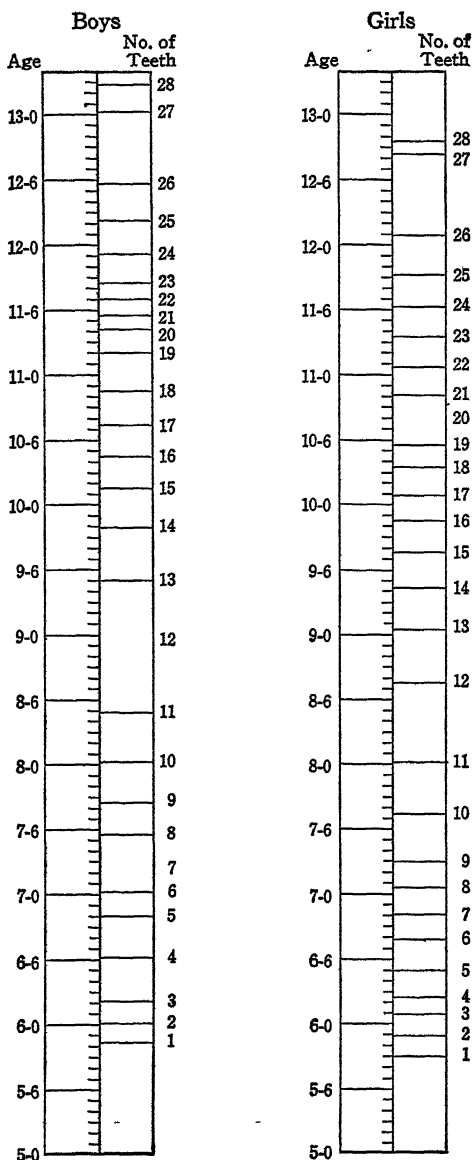


FIG. 41. CATTELL DENTAL AGE SCALE

Showing the chronological age for each number of permanent teeth erupted.
(Reprinted by permission of the Harvard University Press.)

*Ossification.*¹⁰ The ossification of the bones has been studied by the use of X-rays. At birth approximately two hundred seventy ossification centers are found. The number decreases during the next two or three years, through the fusion of primary centers, and then increases steadily until there are approximately three hundred fifty separate bony masses by the age of fourteen. After this time the number decreases, but only in the twenties does the number reduce to the adult level of two hundred six or eight.¹¹ At birth certain bones and parts of bones are more largely ossified than others. The lower part of the femur, the bone of the upper leg, is ossified in practically all full-term infants, but may not be in those prematurely born. The ossification centers of the bones of the lower leg do not develop as soon as those of the femur. Girls have more centers of ossification at birth than boys, and their bones ossify more rapidly. At any school age girls are likely to be a year or two in advance of boys in this measure of anatomic development,¹² as may be seen in Figure 40.

*Dentition.*¹³ Teeth which normally appear while the child is young tend to erupt at a more uniform rate than those which make their appearance at a later age. At any age in childhood, dentition is farther advanced in girls than in boys. A useful scale for measuring dental development has been devised by Cattell and is shown in Figure 41.

6. THE MUSCULAR SYSTEM ¹⁴

Growth of the muscles in proportion to total body weight is relatively slow during childhood. At birth the total muscular

¹⁰ Adair and Scammon, in *American Journal of Obstetrics and Gynecology*, vol. 2, pp. 35-60; Baldwin, Busby, and Garside, *Anatomic Growth of Children*; Hellman, in *American Journal of Physical Anthropology*, vol. 11, pp. 223-257; Hess and Weinstock, in *American Journal of Diseases of Children*, vol. 29, pp. 347-354; Sawtell, in *American Journal of Physical Anthropology*, vol. 12, pp. 293-302.

¹¹ See Scammon in Abt, *Pediatrics*, vol. 1, pp. 257-445.

¹² Ossification ratio is the ratio of the ossified area of certain bones to a certain total area which roughly represents general skeletal size. It indicates the degree to which individuals, apart from differences in general skeletal size, have developed anatomically.

¹³ Cattell, *Dentition as a Measure of Maturity*; Cattell, in *School and Society*, vol. 27, pp. 52-56; Pyle and Drain, in *Child Development*, vol. 2, pp. 147-152.

¹⁴ Feldman, *Principles of Ante-Natal and Post-Natal Physiology*.

ture weighs less than one-fourth as much as the entire body; at eight it is slightly more than one-fourth. At fifteen the muscles weigh a third of the total body mass, and at sixteen they are likely to account for more than two-fifths. As we have shown elsewhere,¹⁵ the rapid post-puberal increase in volume or weight of muscle is usually followed, in the case of boys, by an even more rapid increase in muscular strength. During the years of childhood muscle fibers become both thicker and longer (Köllicker, Westphal, MacCollum).¹⁶ They may be as much as five times as thick at maturity as at birth.

7. THE CIRCULATORY AND RESPIRATORY SYSTEMS ¹⁷

The Growth of the Heart and Blood Vessels. During childhood the blood vessels increase in length and diameter, and the walls become thicker and of stronger texture. Growth studies of the heart have been made by the X-ray method of Bardeen, and in the dissecting rooms of various anatomical laboratories. Care has been taken to exclude all cases in which pathological conditions might affect the size or weight of the organ. Combining data from several of these sources gives a rough index of growth. At the age of six, the average child's heart weighs four or five times as much as at birth. At twelve it weighs approximately seven times as much, and at maturity, probably twelve times as much as at birth. Increases in the transverse and long diameters of the heart at various ages are shown in Figure 42. The shape of the heart varies greatly among children. In some it is broad and low-lying, in others it is long and narrow, and between these extremes there are many gradations of shape.

¹⁵ Brooks, *Psychology of Adolescence*, pp. 47-50.

¹⁶ Feldman, *op. cit.*, pp. 350-351.

¹⁷ Bardeen, in *American Journal of Anatomy*, vol. 23, pp. 463 ff.; Bean, *Contributions to Embryology*, vol. 9, no. 37, pp. 263-284; Lincoln and Spillman, in *American Journal of Diseases of Children*, vol. 35, p. 792; Vierordt, *Anatomische, Physiologische, und Physikalische Daten und Tabellen*, pp. 36-37; Ziskin, in *American Journal of Diseases of Children*, vol. 30, pp. 851-855.

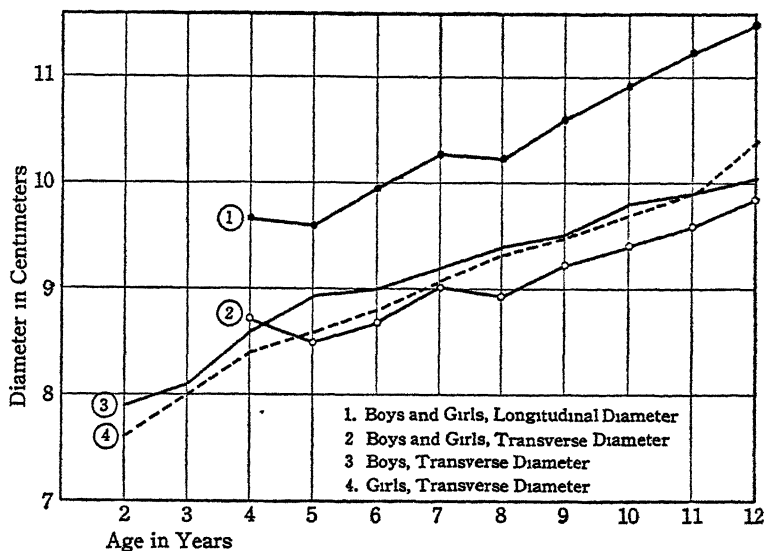


FIG. 42. LONGITUDINAL AND TRANSVERSE DIAMETERS OF THE HEART, AGES TWO TO TWELVE YEARS

(Ziskin, 1, 2; and Lincoln and Spillman, 3, 4.)

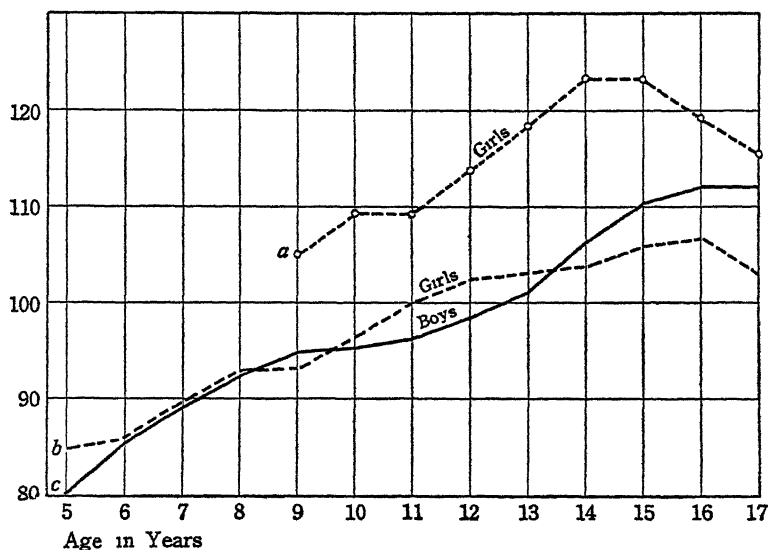


FIG. 43. SYSTOLIC BLOOD PRESSURE AT VARIOUS AGES

(a, Burlage; b, c, Richey.)

*Blood Pressure, Heart and Pulse Rates.*¹⁸ The blood pressure of both boys and girls increases with age. During early childhood, there is little difference between the sexes, but between the ages of ten and thirteen, blood pressure is higher in girls than in boys. This is an example of the general trend toward an earlier incidence of maturity among girls, which has been noted in connection with several other types of measurement. After the age of sixteen, blood pressure probably decreases in girls. Figure 43 indicates these facts. There is some evidence that high blood pressure accompanies puberty in both sexes.¹⁹ Blood pressure has little relationship to the height of the individual, and only a moderate relationship to weight.

Heart and pulse rates decrease considerably during child-

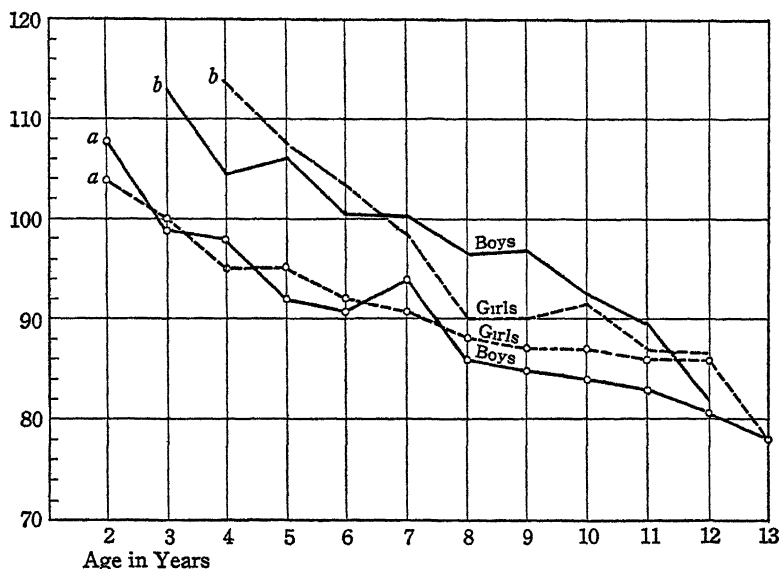


FIG. 44. HEART RATE AND PULSE RATE AT VARIOUS AGES
(a, Lincoln, and b, Lincoln and Nicolson.)

¹⁸ See Burlage, in *American Journal of Physiology*, vol. 64, pp. 252-284; Lincoln, in *American Journal of Diseases of Children*, vol. 35, pp. 398-410; Lincoln and Nicolson, in *American Journal of Diseases of Children*, vol. 35, pp. 1001-1020; Richey, in *American Journal of Diseases of Children*, vol. 42, pp. 1281-1330.

¹⁹ See Richey, *op. cit.*, p. 1315.

hood, the rate of decrease being slightly greater during the earlier years. As is shown in Figure 44, this change is typically from a rate of about 110 at the age of two or three, to one of about 80 by thirteen.

Breathing Capacity. Breathing capacity, also known as vital capacity, is defined as the maximum amount of air that can be exhaled from the lungs after a maximum inhalation. It is usually measured by the wet spirometer, an apparatus for measuring the volume of a gas. The child exhales into a tube which leads into a cylinder which rises within another cylinder. A scale indicates the number of cubic inches exhaled.

At birth and for a few years thereafter it is not practicable to use the wet spirometer to measure the child's breathing capacity, since the young child cannot be persuaded to exert himself sufficiently. Accordingly, we have no reliable information before the sixth year. From the age of six to the age of twelve

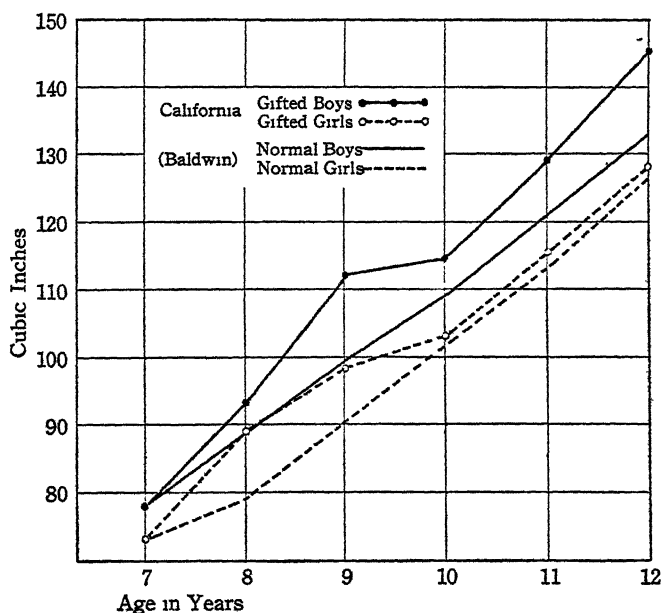


FIG. 45. BREATHING CAPACITY, AGES SEVEN TO TWELVE YEARS
(Baldwin.)

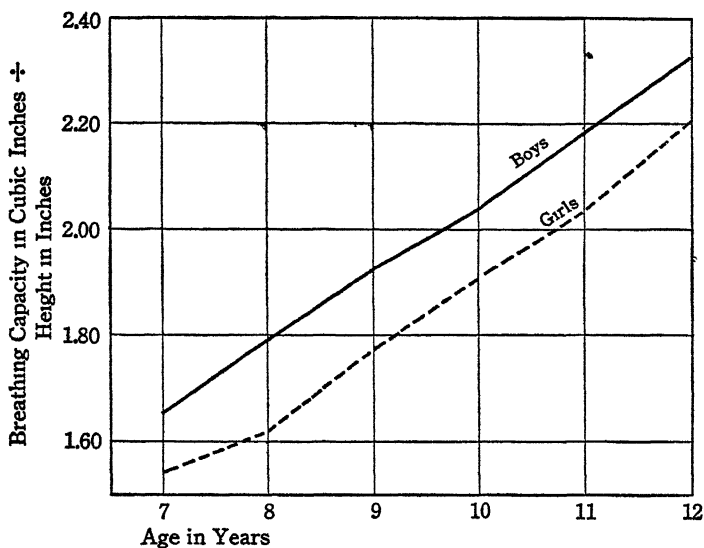


FIG. 46. VITAL-CAPACITY-HEIGHT RATIOS, AGES SEVEN TO TWELVE YEARS
(Baldwin.)

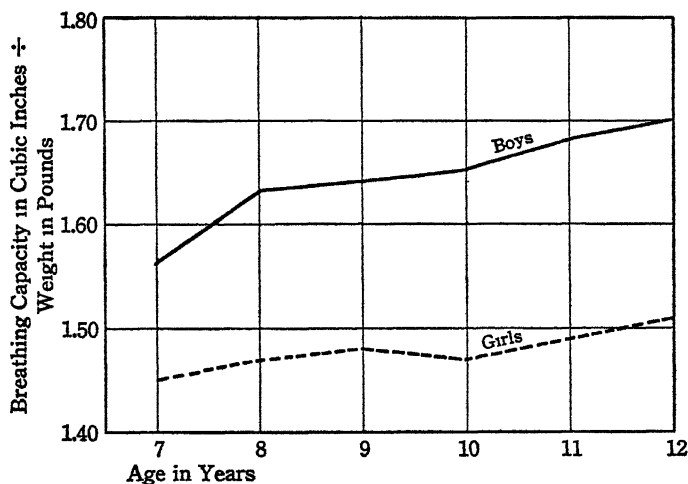


FIG. 47. VITAL-CAPACITY-WEIGHT RATIOS, AGES SEVEN TO TWELVE YEARS
(Baldwin.)

the breathing capacity of boys and girls almost doubles.²⁰ Boys at each of these ages excel girls in this function, as shown in Figure 45. The most noteworthy sex differences are found after the age of twelve, since boys' breathing capacity again almost doubles during the succeeding six years whereas that of girls increases only approximately 50 per cent.

Breathing capacity is closely related to height and weight. We would expect this, since tall and heavy children require a greater amount of oxygen than shorter and lighter children, in order to meet the greater demands made upon their respiratory systems.²¹ The relationship is closer among boys than among girls.

Figures 46 and 47 show the ratios between breathing capacity, and height and weight at various ages throughout childhood. The ratio of breathing capacity to height increases constantly throughout this period, being also uniformly greater for boys than for girls. These curves indicate that the rate of increase of breathing capacity exceeds that of height in order to meet the greater demands of the body for air. The ratio of breathing capacity to weight shows divergent trends in the two sexes. For boys the ratio increases considerably, while for girls it increases very little. Possibly the more active muscular efforts of boys contribute this difference.

8. THE NERVOUS SYSTEM ²²

Early Growth of the Nervous System. The nervous system grows most rapidly before birth and during the first three or

²⁰ Baldwin, *The Physical Growth of Children from Birth to Maturity*, p. 152; also Terman, *Genetic Studies of Genius*, vol. 1, pp. 148 ff.

²¹ According to Baldwin, the average correlations for ages seven to twelve are as follows. boys — breathing capacity and height .778, breathing capacity and weight .729; girls — breathing capacity and height .628, breathing capacity and weight .539.

²² Berry and Porteus, in *Training School Bulletin*, vol. 15, pp. 81-92; Donaldson, *Growth of the Brain*, pp. 68 ff.; Ellis, in *Journal of Comparative Neurology*, vol. 32, pp. 1-34; Jordan and Kindred, *A Textbook of Embryology*, chap. 20; McArthur and Doisy in *Journal of Comparative Neurology*, vol. 30, pp. 445-486; Porteus, in *Journal of Applied Psychology*, vol. 8, pp. 57-74; Porteus and Babcock, *Temperament and Race*, chap. 11; Scammon, in chap. 4 of Harris et al., *The Measurement of Man*; Scammon and Dunn, in *Proceedings of the Society for Experimental Biology and Medicine*, vol. 21, pp. 217-221. See also, Child, *Origin and Development of the Nervous System*; Parker, *The Elementary Nervous System*.

four years thereafter. Prenatal growth takes place by an increase both in the number and in the size of the nerve cells. After birth, growth probably is accomplished by the development of the immature cells already present at birth, rather than by the formation of any new cell elements. It has been found that the diameters of certain large peripheral neurone fibers are two or three times as large at the age of two or three years as at birth, but that they grow much more slowly thereafter. The development of immature nerve cells into functional activity adds to the intricacy of neural organization of the young growing child.

The Growth of the Brain. Accurate knowledge on the growth of the brain is not easily obtained. The information that we have is derived from two sources, first, from the weights of brains of the dead as found in anatomical laboratories, and second, from brain volume estimations based on certain external measurements of the crania of living children. Individual growth curves obviously cannot be secured by the first method. The second method is subject to certain limitations of technique and has not been used widely enough to give individual growth curves.

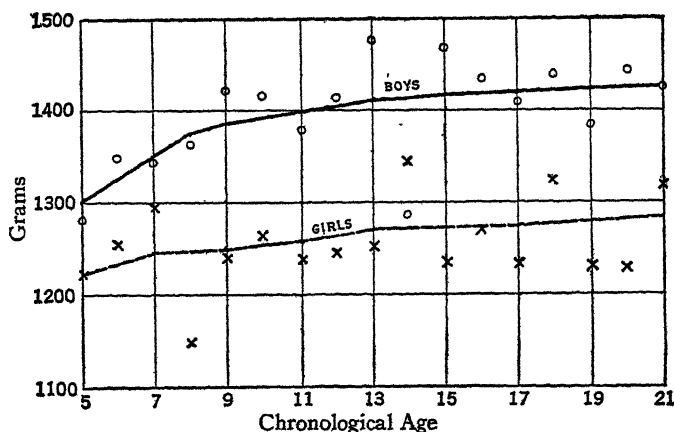


FIG. 48. BRAIN WEIGHT AT DIFFERENT AGES
219 boys; 215 girls. (Vierordt.)

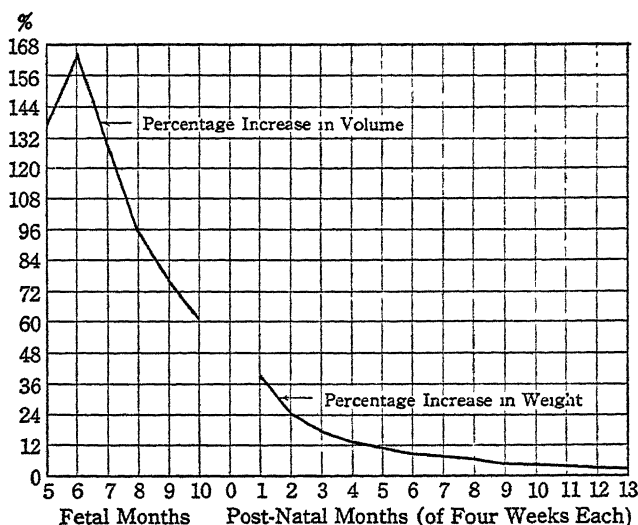


FIG. 49. MONTHLY PERCENTAGE INCREASE IN VOLUME AND WEIGHT OF THE CEREBELLUM
(Scammon and Dunn)

According to the first kind of evidence, the most rapid rate of growth is in the fetal period and during the first three or four postnatal years. According to Scammon²³ the brain has attained approximately four-fifths adult weight by the age of four years. Growth is slower after this time, being almost completed by the beginning of adolescence, as is shown in Figure 48. The cerebellum grows very rapidly during the fetal months, less rapidly but still at a high velocity during the first two post-natal months, and less rapidly thereafter. These conclusions may be drawn from Figure 49 which shows the rate of growth at various ages. At birth the cerebellum constitutes approximately six per cent of total brain weight, at the age of twelve it is about ten per cent, and from then to maturity it is less than eleven per cent. The cerebellum attains nearly two-thirds of its adult weight by the end of the first postnatal year, and nearly four-fifths by the end of the second year.

The differential rates of growth of the brain and the whole

²³ *Op. cit.*, p. 188.

body may be seen from the fact that at birth brain weight is approximately one-eighth that of the entire body; at ten, one-eighteenth, at fifteen, one thirtieth; and at maturity, one fortieth. At maturity, the brain is less than four times its birth weight, whereas heart, liver, and lungs are from ten to eighteen times their weights at birth.

9. GENERAL BODILY GROWTH

Total bodily growth is largely a summation of the growth of various organs, each of which follows its own laws of development.²⁴ Various segments of the body seem to have different periods of rapid development. When curves are drawn for the total composite growth they show, according to Davenport, two and only two outstanding periods of accelerated growth, the circumnatal and the adolescent or circumpuberal. The growth of the body as a whole seems to follow the law of developmental direction, that is to take place in a cephalo-caudal direction, as we have seen in the preceding chapters.

The percentage rate of growth differs for various parts of the body and at various ages of childhood, as has already been demonstrated. The annual percentage increments of height and weight are greater in the earlier years than during the later ones with some exception in weight at the time of adolescence. We can show this by taking the growth curves for height and weight from birth to maturity and drawing vertical lines, as has been done in Figures 50 and 51, for each successive ten per cent increment in stature and weight, respectively. An inspection of Figure 50 shows that in the course of years after birth, it takes successively longer times to add each ten per cent increment to stature. Less than two months are required immediately after birth for the body to grow ten per cent taller. At the age of eight, more than two years are required, while at twelve, nearly three years are needed. The growth curve for weight shows an even greater velocity during the first year than is found for height. The amount of time required to add

²⁴ Davenport, in *Journal of General Physiology*, vol. 10, pp. 205-216.

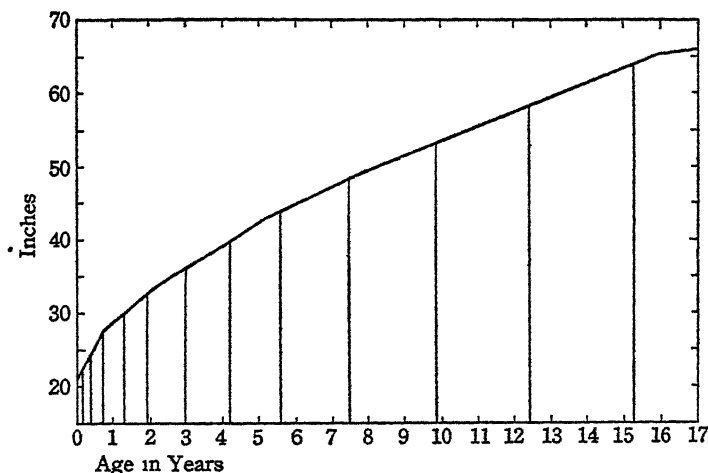


FIG. 50. TIME REQUIRED FOR SUCCESSIVE TEN PER CENT INCREASES IN HEIGHT FROM BIRTH TO SEVENTEEN YEARS

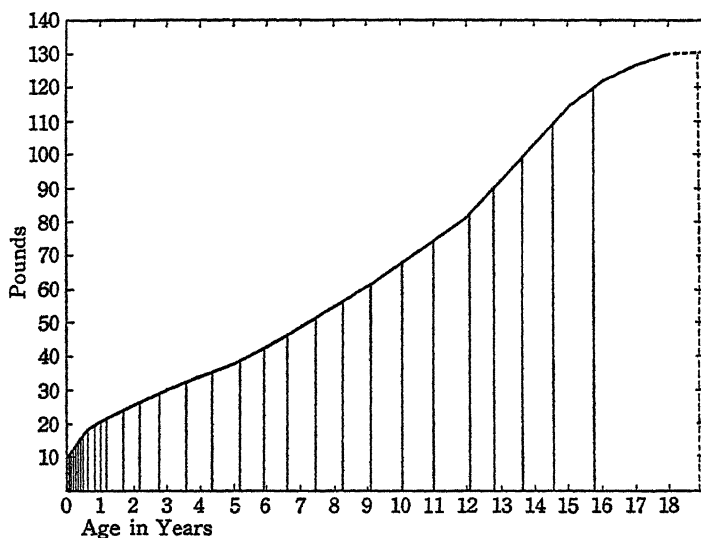


FIG. 51. TIME REQUIRED FOR SUCCESSIVE TEN PER CENT INCREASES IN WEIGHT FROM BIRTH TO EIGHTEEN YEARS

ten per cent to the weight is longer as the child gets older, with some exceptions just before or at the time of puberty.

Types of Growth. By representing weight or height each year as a percentage of the total at maturity, Scammon²⁵ has drawn growth curves for different parts and organs of the body. These he has divided into four types. They are: (1) The *lymphoid*, in which weight increases rapidly until eleven or twelve and then decreases almost as rapidly to the adult level, attained at twenty years, which is slightly more than half that of age twelve. This is the curve for development of the thymus gland and lymph nodes. (2) The *neural*, with its rapid early growth to three or four, gradually slowing down and reaching almost adult level by twelve or fourteen. (3) The *general* type, with a rapid rise in early infancy and another around puberty, which is the curve for growth of the body as a whole, with the exception of the head and neck. The respiratory and digestive organs, kidneys, aorta, spleen, musculature as a whole, and skeleton as a whole also develop according to this type. (4) The *genital* type, in which growth is slow until puberty, and then very rapid.

*Individual Differences in Growth.*²⁶ To what extent do individuals differ in development? We know that some children at ten are tall and others are short. Do the short ones grow more rapidly, or do they grow for a longer time than the tall ones, so as to catch up with the latter and have the same adult height? Are children who are alike in development in one respect alike or similar in some other respect? Do children who differ in one thing differ also in other respects?

Apparently, girls who mature early are taller and heavier than those of the same age who mature later.²⁷ These differences have been evident long before puberty, even as early as middle childhood.²⁸ Obviously, the retest method is the only

²⁵ In chap. 4 (especially p. 193), Harris *et al.*, *The Measurement of Man*.

²⁶ Richey, in *American Journal of Diseases of Children*, vol. 42, pp. 1281-1330; Van Dyke, *School Review*, vol. 38, pp. 211-221.

²⁷ See Baldwin, *Physical Growth of Children from Birth to Maturity*.

²⁸ Richey, *op. cit.*, p. 1322.

one by which crucial information can be secured on this problem. According to recent studies, girls who mature sexually before the age of thirteen are taller and heavier at each age from six to fourteen, than are girls who mature at thirteen. The latter are, in turn, taller and heavier at each age from six to fifteen than those maturing after thirteen. This is indeed noteworthy. Apparently, the differences previously noted between early-maturing, average-maturing, and late-maturing girls are almost equally noticeable in these same girls long before puberty, and indicate a fundamental difference in anatomical and physiological development. Those who mature earlier approach the adult level of physical development, especially in height, earlier than those who mature later. (See Figs. 52 and 53.)

Circumpuberal Increase in Height and Weight. Three important questions have been raised about adolescent growth. (1) Is there an increase in rate of growth in height and weight about the time of puberty? (2) If so, does it occur a year or two before puberty, at puberty, or a year or two thereafter?

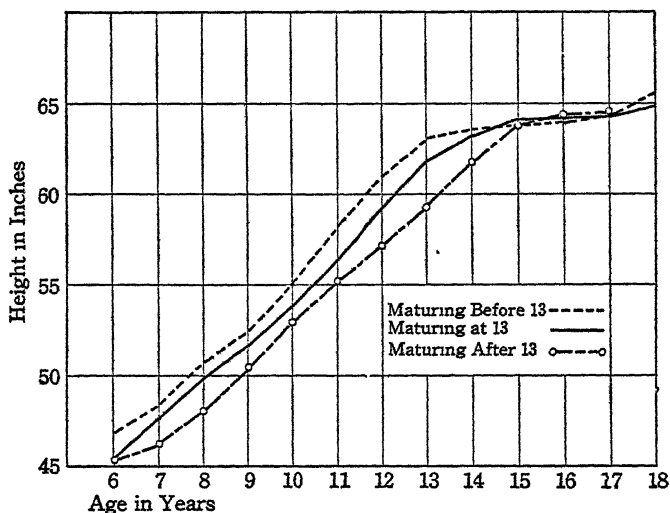


FIG. 52. HEIGHT OF GIRLS MATURING AT DIFFERENT AGES
(Richey. Retests, $N = 1104$.)

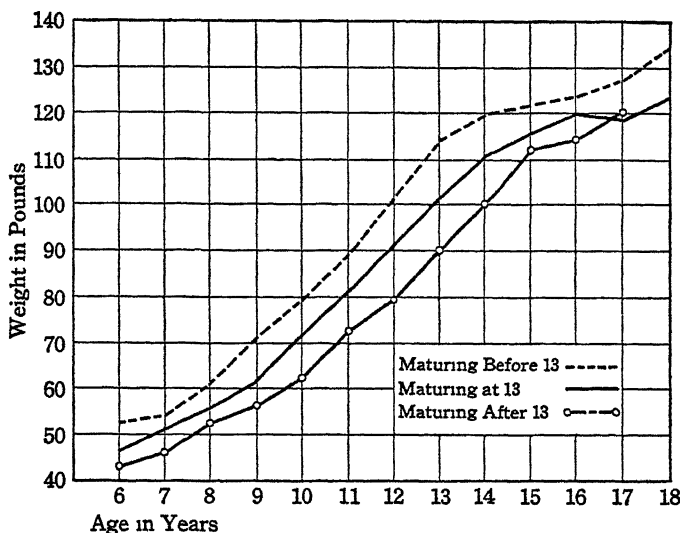


FIG. 53. WEIGHT OF GIRLS MATURING AT DIFFERENT AGES
(Richey. Retests, $N = 1104$.)

(3) Do taller children of a fairly homogeneous group tend to mature earlier than shorter ones, as Baldwin believed?²⁹ Much has been written about adolescent acceleration in rate of growth, but there has been much disagreement about the time at which it takes place. Baldwin has concluded that regular growth preceding adolescence is followed by regular growth during adolescence, and that slower growth before the teens often is followed by more rapid growth during adolescence, but he does not indicate the proportion of children belonging to each group.³⁰

The only adequate way of finding out exactly when any acceleration in growth takes place is to secure individual growth curves for a few years before and after the establishment of puberty. This has been done and is reported in a recent study³¹

²⁹ *Op. cit.*, p. 194.

³⁰ The author has been conducting an investigation to determine what proportions of boys and girls grow regularly before and during adolescence, and what proportions grow slowly before and more rapidly during adolescence. No conclusions, however, can yet be drawn.

³¹ Van Dyke, in *School Review*, vol. 38, pp. 211-221.

which throws considerable light on this problem, although only 60 girls were included in it. The greatest increase in height and weight occurred during the year before puberty, as may be seen in Table 7.

TABLE 7. THE EFFECT OF THE ADVENT OF PUBERTY ON THE GROWTH IN HEIGHT AND WEIGHT OF SIXTY GIRLS
(Van Dyke)

Group 1 20 girls who matured at 12 years or younger

Group 2 19 girls who matured at 13 years

Group 3 16 girls who matured at 14 years

Group 4 5 girls who matured at 15 years.

HEIGHT (in inches)	GROUPS				ALL
	1	2	3	4	
Two years before maturity	55 0	56 1	56 0	59 8	56 0
Increment	2 9	2 8	2 3	1 8	2 6
One year before maturity	57 9	58 9	58 4	61 6	58 6
Increment	3 3	2 8	2 8	2 1	2 9
At maturity	61 1	61 7	61 1	63 8	61 5
Increment	2 1	1 5	1 6	1 2	1 7
One year after maturity	63 2	63 2	62 7	65 0	63.2
Increment	0 8	0 7	0 9	0 6	0 8
Two years after maturity	64 0	64 0	63 5	65 6	64 0
WEIGHT (in pounds)					
Two years before maturity	79 1	79 1	76 0	81 9	78.5
Increment	10 6	10 1	10 5	6 2	10 1
One year before maturity	89 8	89 2	86 5	88 1	88 6
Increment	14 2	15 1	13 1	12 9	14 0
At maturity	103 9	104 2	99 6	101.0	102 6
Increment	12 3	9 4	8 2	10 1	10 1
One year after maturity	116 2	113 6	107 7	111.0	112 7
Increment	7 3	6 5	5 4	5 1	6 3
Two years after maturity	123 5	120 2	113 1	116 1	119 0

It is indeed noteworthy that the girls who matured at twelve years or younger, at thirteen, at fourteen, or at fifteen had a greater increase in weight the year before puberty than either in the second year before puberty, in the year of or during the year after puberty; and that essentially the same thing is true of height.³² The next greatest increment in height was

³² The only exception being that girls maturing at thirteen increased the same amount in height two years before puberty as during the year before puberty.

two years before puberty. Apparently Van Dyke has grounds for concluding that the "sudden rise in height and weight curves of girls comes one or two years before puberty rather than exactly at the time of puberty or after this development."³³ Although further data are needed on this problem, yet Van Dyke's conclusion fits in with other important considerations. We naturally would expect sex maturation to come when adult size has been nearly reached.

SELECTED REFERENCES

In *The Physical Growth of Children from Birth to Maturity*, Baldwin gives an annotated bibliography of nearly a thousand titles on physical growth (to 1919); Dawson and Stoddard give an excellent review of the literature (to Nov. 1932) on physical growth from birth to puberty, in *Review of Educational Research*, vol. 3 (April, 1933), chap. 3; Meredith and Stoddard carry forward a critical review of the literature to November, 1935, in *Review of Educational Research*, vol. 6 (February, 1936), chap. 4.

Boynton, in *The Physical Growth of Girls*, and Meredith, in *The Rhythm of Physical Growth*, give data on growth of white boys and girls of Iowa City from birth to eighteen years of age, covering many features of growth; Gray and Ayres, in *Growth in Private School Children*, chap. 7, report on 18 anthropometric measurements of private school boys and girls, ages 1 to 19 years; Scammon, in chap. 4, *The Measurement of Man* (by Harris *et al.*), discusses the measurement of the body in childhood and presents growth curves for the major types of postnatal growth, such as lymphoid, neural, general, and genital; Woodbury, in *Statures and Weights of Children Under Six Years of Age*, gives data on bodily growth in height and weight of thousands of boys and girls of each of these ages.

See also additional references at the end of this volume.

³³ *Op. cit.*, p. 217.

CHAPTER VI

THE DEVELOPMENT OF PHYSICAL AND MOTOR CAPACITIES

EVERY child faces the important task of developing a harmonious and effective coordination of his motor mechanisms. The general helplessness of the infant, so evident at birth, gradually is replaced during childhood by muscular achievements of increasing strength, speed, and precision. To his limited repertory of definite responses in infancy which have been described in Chapter IV, the child adds many more elaborate motor capacities, whose course of development we now trace. In general, the development of physical and motor capacities shows the increasing complexity of the child as an organism. A knowledge of this aspect of behavior is essential for an understanding of childhood as a whole.

I. MOTOR COORDINATION

Muscular Control. Many of the muscles of the body are arranged in pairs, so arranged that when one muscle of a pair contracts, the other usually relaxes or extends. If both muscles of a pair contract with equal tension, or if both are equally relaxed, there will be no motion, but only immobile rigidity or relaxation. The former sometimes may be seen in young children when they are very angry or when they are terror-stricken with fear. Motor control consists in a suitable balance between the contracting and the relaxing phases of the antagonistic muscles. The development of muscular control is dependent upon the maturation of nerve and muscle structures, as well as upon opportunities for practice.

The young child needs many opportunities for gross movements and activities of various kinds. He also needs freedom from excessively exacting standards of control while he is

learning the simpler coordinations. Parents who insist upon too great a precision of movement and who urge the child to make very difficult coordinations do more harm than good. The child needs opportunities to make many seemingly random, uncoordinated movements, for through them he has many fundamental sensory experiences arising from skin, tendons, muscles, and joints. Gross muscular control is best achieved when the child is free from the undesirable tensions resulting from too much attention to fine motor coordination. Too much discipline, nagging, and the like are harmful. They tend to make the child tense and hence interfere with his effective motor development. They also may have a deleterious effect upon his developing well-coordinated behavior patterns of the broader sort. The child needs to be able to relax and not be oversensitive to stimulations of various kinds. In earlier childhood, freedom of movement is most important. The fine muscular control which yields a high degree of accuracy will be developed later.

From the Simple to the Complex. That which seems a simple motor habit to an adult may in truth be a complex one for the child. The parent, overdesirous that the child learn to feed himself properly, may put great stress upon his doing so with great accuracy. The child may not have enough command of the simpler preliminary processes upon which the complex motor habit depends. The fine coordinations needed for many complex motor skills should follow the development of motor control of the larger muscle groups. The child needs neither to have parent or teacher do too many things for him, nor to have them give him complex tasks which require too great precision.

Sequence in Motor Development. Recent studies² seem to show that motor development follows an orderly sequence. Motor control does not develop in a haphazard manner. The child does not first acquire, for example, control of legs, then of eyes, then of head, then of feet, then of arms, then of neck, then of hands, etc. The order of development of motor habits seems

² Shirley, *The First Two Years of Life*, vol. 1.

to be regular and to follow roughly a sequence which begins with the eyes, head, and neck, and then involves the arms and the upper portion of the trunk, and finally leads to control of the lower portion of the trunk, the legs, and the fingers. This head-to-feet or cephalo-caudal sequence operates in the post-natal development of function, just as it does prenatally, and in the development of structure.

Motor development is dependent upon bone and muscle growth and upon the maturation of neural structures. Other important prerequisites to its development are the increased leg-trunk ratio, the increased weight-height ratio, and probably also the shift in the center of gravity of the body, which occur during childhood.²

2. POSTURE

Head Control. The newborn infant normally is unable to hold up his head when lying prone, or to hold it erect when he is held in a sitting posture with suitable body support, although rare cases have been reported in which infants were able to do both of these things during the first few days of postnatal life. Usually a normal baby one month old, when held in a horizontal position lying on his back, is unable to hold his head in the horizontal plane, but allows it to drop down.³ The average two-month-old infant, however, is able to hold his head in the horizontal plane. If, now, the infant is turned over on his face and supported in the prone position at chest and abdomen, he can hold his head erect in the horizontal plane at the age of one month. By the age of two months he will hold his head above the horizontal plane, at an angle of as much as thirty degrees.⁴ By the time the infant is four months old he nearly always lifts his head up from the table when placed prone upon it. Ap-

² See Shirley, *op. cit.*, p. 175.

³ Gesell, *Infancy and Human Growth*, pp. 103 ff.; *The Mental Growth of the Pre-School Child*, pp. 68 ff.

⁴ See Bryan, in *Child Development* (vol. 1, p. 72), for an account of an infant who, on the second day, when placed prone on a table raised the head at right angles to the line of the spine and turned it from left to right.

proximately 75 per cent of four-month-old infants hold the head erect when seated on the examiner's lap with suitable body support, whereas by six months nearly all do so.⁵ Gesell holds that this control depends fundamentally upon the maturity of the nervous system rather than upon the general health of the child.

Sitting. By the time they are four months old, nearly all infants show some rigidity of the spine upon being handled, as for example, when taken into another person's lap. Such rigidity has been observed during the first ten days of a child's life, but is very rare at that early age. If he is placed upon his back in a horizontal position, the infant usually tries to sit up by lifting his head or shoulders. If given very slight support from pillows or blanket, a few (not quite 20 per cent) may sit up at four months. Approximately one-half to two-thirds of children do so by six months of age. By the age of nine months practically all normal children are able to sit alone.

Standing Alone and with Support. Nearly all normal children can stand alone by the age of eighteen months, whereas from one-fifth to one-half of them can do so at one year. Nutritional factors have considerable effect upon the development of this ability. If given support by having a person's hands placed under their arms, nearly all infants can stand at twelve months, but less than one-half of them can do so at nine months. Sickness, as well as poor nutrition, may modify the course of development of this ability, so that standing with help, as well as standing alone, may appear somewhat later.

According to Shirley⁶ the child's development of an upright posture reveals six stages, as follows: (a) lifting the head when lying on the back, (b) sitting alone momentarily, (c) sitting alone, (d) standing, holding to furniture, (e) pulling self to standing position by means of furniture, (f) sitting from the standing posture.

⁵ Gesell, *The Mental Growth of the Pre-School Child*, p. 68.

⁶ *Op. cit.*, p. 194.

3. LOCOMOTION⁷

Learning to walk is one of the most spectacular accomplishments of the child between the ninth and eighteenth months. Accordingly, it is not strange that it has been regarded very commonly as an important index of development.

Stages in the Development of Locomotion. At least three forms of locomotion may be observed among infants of various ages and degrees of motor maturity. Sometimes these have been regarded as successive stages in the development of locomotive ability. These methods of movement are crawling, creeping, and walking. Crawling refers to various forms of progression in which the infant does not lift his body from the floor and move on all-fours. In crawling the infant may move himself about in a sitting posture, using one leg to push himself along, the other being doubled up under him or extended. The arms and hands may be used to help the movement in some cases. The infant, however, may be prone with head and shoulders raised from the floor, and may use one or both legs to hitch himself along. If he uses one leg for propulsion he may drag the other in an extended position. He also may use arms and hands to help propel himself. In creeping, the infant moves on all fours with the body or trunk lifted from the floor. In walking the upright position is assumed.

In the development of creeping the following stages have been observed:⁸ (a) lifting the head, chin free, when on the stomach; (b) lifting the head, chest free, when on the stomach; (c) knee pushing or "swimming"; (d) rolling; (e) rocking, pivoting, and worming along; (f) scooting backward by using the hands; (g) creeping forward. In the development of walking, these stages are enumerated: (a) an early period of stepping; (b) standing with the support of a person; (c) walking with help; (d) standing alone; (e) walking alone. As the child walks alone he improves, his greater skill in walking being seen in

⁷ Gesell, on pp. 72-75 of *The Mental Growth of the Pre-School Child*, gives age norms for various motor responses which are important in the development of walking

⁸ Shirley, *op. cit.*, pp. 194-195.

the following trends: (a) a gradual increase in the speed of walking; (b) an increase in the length of step; (c) a decrease in the width of the step; (d) a decrease in the angle of the step; and (e) an increasing tendency for the steps to be straight rather than with toes pointing much outward.

Photographs of infants, showing their early attempts at walking, have been taken. An examination of them is interesting and instructive.⁹

We must not regard crawling, creeping, and walking as fixed, inevitable, clearly defined stages which every infant exhibits in his acquisition of the power of locomotion. Considerable individual variation exists, and different infants make different selections out of the possible coordinations available for locomotion. Some infants may achieve upright walking with what seems to be an irregular order of development, without obviously passing through an earlier stage.

Locomotor Responses at Various Ages During Infancy. By the age of four months, nearly all infants are able to move themselves in some direction when placed prone on the floor, usually by a considerable amount of squirming, wriggling, and other use of arms and legs. By six months, less than a fifth of normal infants respond by creeping when placed prone on the floor, but by nine months from two-thirds to four-fifths do so, and at twelve months practically all infants can use this form of locomotion. Marked deviations from these accomplishments, especially if they are retardations, have considerable significance as evidence of delayed development, being suggestive, according to Gesell, of retarded neural development. We do not know the exact retarding effect of disease, malnutrition, hampering clothing, or other environmental factors, but they also undoubtedly have some influence.

If held, with the examiner's hands under the arms, so that the feet touch the floor lightly, from two-thirds to four-fifths of nine-month-old infants make rhythmic stepping movements.¹⁰ A few infants at nine months can walk if given some.

⁹ See, for example, Burnside, in *Genetic Psychology Monographs*, vol. 2, pp. 284-372.

¹⁰ Very rarely, however, a newborn infant may make such movements when held

support by placing the hands under their arms, but this is an advanced stage of development for this age. At twelve months, a majority of normal children walk with help.¹¹ By the age of twelve months, from one-fifth to one-half of normal infants walk alone, and by eighteen months, practically all do so. Variations in the age of manifesting these motor capacities should be studied since they may be caused by poor nutrition, by the effects of disease, or by other causes, and special medical or other care may be needed.

In developing locomotion the infant manifests certain specific motor responses which are indications of his progress in control of his body. Practically all infants can roll from the side to the back at the age of four months, if they have not been denied freedom of movement and ample opportunity for exercise previously. A few children at four months are able to roll from the stomach to the back, or from the back to the stomach, but at six months more than two-thirds of them seem able to do so. Some children very early push with the feet if held so that the feet touch the observer's lap.¹² By the age of three months a larger number show this response, and at four months nearly all infants do so. By six months of age this reaction is so strongly developed that practically all children give a vigorous push when tested.

Movements in the Infant's Walking. In developing the power of walking the child shows considerable irregularity of specific movements. He may move one foot forward, then shift the weight to it, and finally draw the other foot forward about as far as the first foot. He then may shift the weight to the second foot and move the first one forward as before. According to this pattern, he always takes the forward step with the same foot, as many children do when going up or down stairs, merely bringing the other foot forward beside the first one to support the weight of his body while advancing the first one. In time he comes to form a rhythmic pattern in which arm and leg movements are well coordinated. Before he reaches this de-

¹¹ According to Gesell's norms, 65 to 85 per cent.

¹² A few infants have been observed who did this during the first two weeks.

gree of development, however, he exhibits many movements of legs, feet, toes, body, and arms, which probably are best regarded as exploratory in character, but which also probably serve the important function of strengthening these parts so that they are more effective in later locomotor responses. The infant uses his arms and hands in balancing, as anyone may see for himself by watching a few infants as they first walk alone.

Investigation¹³ seems to indicate that the foot is relatively unskilled during the child's first walking, but that as he gets older, it becomes more skillful. Improvement usually continues throughout the pre-school period.

Significance of the Age of Walking. Parents whose children are not doing well in the primary grades often make excuses for them on the grounds that they were late in getting started in their development. For example, they point out that the child did not walk until the age of twenty or twenty-four months or did not begin talking until much later than the average time. Such parents believe that the child's difficulty in doing the work of the school will be overcome in time. They think that he has been retarded in development but will soon overcome the handicap of a late start. Others, however, often conclude that a child's retardation in walking is evidence of his intellectual inferiority. Many a parent today is much concerned if his child is slow in walking alone. He is worried not so much over the child's physical condition as over his possible feeble-mindedness. It is true that investigation¹⁴ has shown that the majority of children can walk alone by thirteen or fourteen months and that practically all children walk alone by the age of a year and a half. It is true also that normal children walk at an earlier age than do feeble-minded ones.¹⁵ Careful observational records, however, have shown also that many children who were late in walking were of normal or even much above normal in-

¹³ Wolff, in *American Journal of Diseases of Children*, vol. 37, pp. 1212-1220.

¹⁴ Smith, Lecker, Dunlap, and Cureton, in *Journal of Genetic Psychology*, vol. 38, pp. 489-498; Gesell, *The Mental Growth of the Pre-School Child*, pp. 72 ff

¹⁵ According to Mead, *The Relation of General Intelligence to Certain Mental and Physical Traits*, the children of normal intelligence walked at the average age of 13.38 months; the feeble-minded at 25.08 months.

telligence. One must be very cautious in interpreting or accepting the results of studies in which age of walking (as estimated and reported by parents some years afterward) is correlated with scores on mental tests or scholarship in school. Parental accounts, given years after the child began walking, are so inaccurate that the correlations are likely to be worthless.

From the available evidence it appears that malnutrition (rickets), prolonged sickness, diminished opportunity for physical activity, or lack of environmental stimulation toward locomotion as a means to satisfy certain wants, may retard the child's development in walking. Accordingly, it is not wise to draw the conclusion that a child is feeble-minded because he is late in walking, although this may be true in some instances. Careful study and diagnosis are needed to discover the causal factors. The value of the developmental norms for the earlier months is clearly apparent. If the child's development is below normal it is unnecessary to wait until the age of twenty or twenty-four months to discover that fact. Comparison with the developmental norms for weight and for various motor capacities at four to six months may reveal the need for remedial treatment at this early age.

Climbing. The child may climb stairs very early by crawling and creeping if he has opportunities and incentives. Usually he does this before he can walk alone. He may crawl down stairs also, often tumbling from one step to the next, sometimes crawling or creeping down backwards. After he has acquired some facility in walking alone, he will attempt walking upstairs using the hand rail or holding to the hand of an older person, provided that he has the opportunity, is in good physical condition, and has not been conditioned against it through some strong emotional experience such as fear. By the age of three years most children go upstairs in the manner mentioned above. Usually they do so by putting one foot up on a step, and then bringing the other foot up beside it, the same foot being used each time to make the advance. With greater facility the use of handrail is omitted, although from time to time it is resorted to when in a hurry, or when under stress of excite-

ment. By the age of four, most children go up and down stairs in the adult manner. However, one may observe a considerable number of five-year-olds in the kindergarten whose method of mounting steps is the earlier immature one. Short children, and those whose legs are relatively short in proportion to trunk length, often find difficulty in attaining the mature method by the age of four or five years, especially if the risers of the stairs are higher than is suitable for kindergarten-primary children. Much freedom and opportunity for such motor activities are desirable for children from an early age, but with adequate precaution against serious injury. A few bumps will do the infant no harm, whereas the stimulus of successfully doing things on his own account seems to have considerable value in developing such traits as self-reliance and independence.

The climbing of trees and other similar objects, by complicated coordinations of arm, leg, body, and head movements, begins to develop during the pre-school period if opportunity is offered. If it is not stopped by accident, painful experience, or parental objection, it becomes very effective during the later years of childhood. Children in rural districts who have lived active lives with ample opportunities, freedom, and stimulation, show remarkable ability in climbing trees. Boys at eight to ten years of age may be found in the tops of trees, often twenty to thirty or more feet from the ground. They make their way up from branch to branch, often being barely able to reach the limb above when standing tip-toe on the one below. Girls, too, enjoy climbing, although social taboo in times past has prevented many a girl having the exhilaration that children get from this activity.

Running. As soon as the child can walk alone, one may observe his efforts at running when he wants to get toward or away from something very quickly. His steps are crudely taken, and he may tumble many times in his haste and awkwardness. As he gets older and the walking movements become more effective, he shows more skill in running. By the time the pre-school period is past, the child has developed this skill so that he can use it very well in various games. It seems

to develop very rapidly during the later elementary school years.

Jumping. Children can jump by the age of two but only by dropping themselves from some little height. They are not likely to jump forward, but merely to jump off the place of support, usually landing in a sprawl from which they have some difficulty in arising. Soon they are able to propel the body forward in jumping, or to propel it upward and forward when standing on the floor. They make rapid improvement, and by the age of four have quite a little ability in jumping. Thus the child at the age of four or five in the kindergarten has frequent occasion to jump, as in dramatizing such nursery rhymes as

Jack be nimble,
Jack be quick,
Jack jump over
The candlestick.

He has many occasions to skip, hop, dance, etc., and these abilities are found among children as they enter kindergarten or sometime earlier.

Nature and Learning in Walking. Walking is principally a native response, the development of which is dependent chiefly upon maturation rather than upon training. Woodworth has suggested that "learning to walk" probably means that "at the age when the child's bones and muscles have become strong enough for walking the nerve connections for coordinating this complex movement have also just about reached the stage when they are ready for business. . . . It takes several weeks of growth to pass from the barely functional condition to the fully functional condition and it is during these weeks of growth that the child seems to be learning to walk."¹⁶

The relative effect of training and maturation upon walking

¹⁶ *Psychology*, p. 96. New York, Henry Holt & Co., 1921. Quoted by special arrangement with the publishers. The rôle of structure and maturation has been studied, by Carmichael (swimming of frogs and salamanders), in *Psychological Review*, vol. 33, pp. 51-58; by Coghill (Amblystoma), in *Anatomy and the Problem of Behavior*; by Shepard and Breed (pecking of chicks), in *Journal of Animal Behavior*, vol. 3, pp. 274-285; and by Spalding (flying of birds), in *Nature*, vol. 12, p. 507. Their work emphasizes the part played by maturation. See also the work of Shirley, in *The First Two Years*, vol. 1, especially chap. 11.

has been the subject of a number of experiments. Two girls, regarded as identical twins, were studied at the Yale Clinic of Child Development.¹⁷ Beginning at the age of 46 weeks, one twin (known as T) was given special training ten minutes daily for six weeks in locomotor activities, including stair-climbing on an experimental staircase. At the age of 53 weeks the other twin (known as C) was given two weeks of training in stair-climbing, the net time spent each day in stair-climbing being approximately the same as that devoted to T during her six-weeks training period. Although these twins were regarded as identical, T was somewhat more active and aggressive. During five weeks of T's special training C was slightly ill and was less active following this illness than before. At the age of 53 weeks and one day, T climbed the stairs more readily than C, as shown in Table 8. On the first trial, C made no effort to

TABLE 8. CLIMBING EFFICIENCY OF IDENTICAL TWINS

T (trained from age of 46 to 52 weeks) and C (untrained), at age of 53 weeks, 1 day. (From Gesell and Thompson)

TRIAL NUMBER	TWIN T		TWIN C	
	Stimulus	Time (in seconds)	Stimulus	Time (in seconds)
1	Ball	65	Bell and musical toy	Failure
2	Ball	27	Bell and musical toy	Failure
3	Ball	25	Ball	95
4	Ball	18	Ball	60
5	Ball	20	Ball	100
6	Ball	11	Ball	40
7	Ball	10.5	Ball	40

ascend the steps. She was helped by the examiner. On the second trial, after some help, she placed her left foot on the first step beside the right one which had been placed there 65 seconds previously by the examiner. In the third and subsequent trials a ball placed at the top of the stairs was used as the stimulus instead of the bell and musical toy. C immediately

¹⁷ See Gesell and Thompson, in *Genetic Psychology Monographs*, vol. 6, pp. 1-124.

proceeded to get it, putting right foot on first step, left foot on first step; right foot on second step, etc., without assistance.

Unless the greater activity of T was enough of an advantage to account for the differential effect, one would conclude that when age is constant, training produces a noticeable locomotor superiority. Gesell believes that this superiority is not "an inherent consequent of the training factor alone."

At 56 weeks, T's time was 11.3 seconds on a first trial, and 13.8 on a second, while C's were 14.8 and 13.9 seconds, respectively. At 79 weeks T was more mobile than C, climbed with more alacrity and agility, but was similar in speed and balance of walking, and in stooping to recover objects on the floor. T's maximum stair-climbing speed was 7 seconds; C's was 8 seconds.

If we assume that the two twins had identical motor ability at the beginning of the experiment, that all environmental factors save the special training were equal, and that conditions of health and general physical vigor had no differential effects, then the maximum effect of six weeks' special training in locomotor activities given between the 46th and 52d weeks as com-

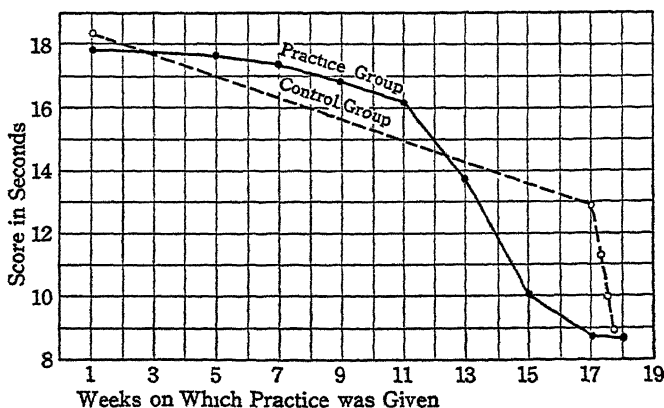


FIG. 54. PRACTICE VERSUS MATURATION IN STAIR-CLIMBING

(Hilgard.) Eight children (average age 28.3 months) practiced for twelve weeks, January to April.

Eight children (average age 28.6 months) practiced for 1 week only, in April.

pared with two weeks' similar special training given between the 53d and 55th weeks, seems, by the age of 79 weeks, to consist in one second's difference in maximum speed of climbing. This 14 per cent difference (7 seconds for twin T, 8 seconds for twin C) was, however, accompanied by T's greater alacrity and agility in climbing, as contrasted with C's hesitatingly deliberate manner of climbing stairs. Gesell and Thompson believe that T's specific locomotor developmental precocity contributed the differences in locomotor performance, and that the effect of early training was slight indeed. They say, "Most significant is the simple fact . . . that Twin C, when her time was ripe, climbed the stairs altogether without tuition. Of similar significance is the fact that Twin T's response to early training was indifferent and impassive. Not until the 50th week did she seem in full possession of a climbing proclivity."¹⁸

One probably should note also that twin T's climbing was largely a creeping upward rather than walking, the hands being used to pull herself up; whereas C, receiving training at a later age, used a more upright position in climbing stairs and did not lean so far forward as T did.

In another experiment, Hilgard¹⁹ gave practice in stair-climbing for twelve weeks to a group of eight children. A matched group of eight others received only one week of training at a later age. The results are given in Figure 54, which shows a conclusion similar to that of the experiment of Gesell and Thompson. These studies are usually interpreted as demonstrating the importance of maturation as compared to training. Since it is so difficult to control the influences of individual differences in motor ability and in general activeness, however, no experiments are entirely conclusive. It is impossible to state with great certainty the relative effect of maturation and training upon motor performances, with our present degree of knowledge.

¹⁸ *Genetic Psychology Monographs*, vol. 6, p. 77. Provincetown, Mass., The Journal Press. Quoted by special arrangement with the publishers.

¹⁹ Hilgard, in *Journal of Genetic Psychology*, vol. 41, pp. 36-56. See also Hicks, in *Child Development*, vol. 1, pp. 90-105; 292-297.

4. PREHENSION (GRASPING)

Processes Involved in Grasping. True grasping involves at least three processes, the visual perception of the object, moving the hand toward it, and finally, closing the hand on it.²⁰ True grasping should be distinguished from the grasping reflex which appears from birth in practically all normal infants. The latter probably has some fundamental place in the development of the later function of prehension. Observational evidence indicates that the child probably gets his first practice in directing his hand movements as he brings the hand or thumb to the mouth.²¹ This activity has been observed during the second and third months. Carrying objects purposefully to the mouth has been observed from the sixth to the nineteenth week at the earliest. Infants by the end of the second week have been known to fixate their eyes on objects which were not moving. Fixating an object which he had grasped, however, or fixating his hand which has grasped the object, seems likely to appear during the fourth month. Children reach for objects at some time between the eighth and sixteenth weeks, although they may be quite unable to direct their movements accurately. Approximately 40 per cent of the four-month-old infants studied by Gesell²² were able to bring their hands together in a closing-in motion so as to secure a red ring dangled before them as they lay on their backs. However, the ability to grasp a seen object is not likely to be developed in the majority of children before the age of six months.

The Development of Grasping. Improvement in the infant's ability to grasp an object relates to the length of time he looks at the object, to the kinds of movements he makes in reaching for it, to the number of indirect movements he makes, and to the percentage of failures in grasping the object. Marked im-

²⁰ For a more detailed analysis of these processes, see Castner, in *Genetic Psychology Monographs*, vol. 12, especially pp. 151-184.

²¹ See, for example, the reports by Brainard, in *Journal of Genetic Psychology*, vol. 34, pp. 231-254; Hall, *Child Study Monthly*, vol. 2, pp. 394-407; Moore, *The Mental Development of a Child*; Shinn, *Notes on the Development of a Child*.

²² *The Mental Growth of the Pre-School Child*, p. 106.

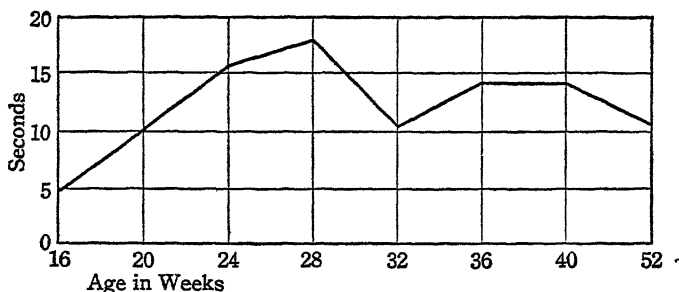


FIG. 55. DEVELOPMENT OF GRASPING

The total duration of regard of object in reaching for it and grasping it. (Halverson.)

provement may be expected²³ from the fourth to the twelfth month in the directness of reaching movements and in the percentage of successes in reaching the object. Figures 55 to 57 show several aspects of this progress. During this time, the infant gives up the primitive closing of the whole hand in trying to grasp a small object, and begins to use the pincer type of grasping, with the thumb and forefinger seizing the object. A pellet approximately one-fourth of an inch in diameter has been used in experiments on this reaction. Other observations show that at the age of twelve months, the child usually can hold a piece of crayon or a pencil. By the time that he is thirty

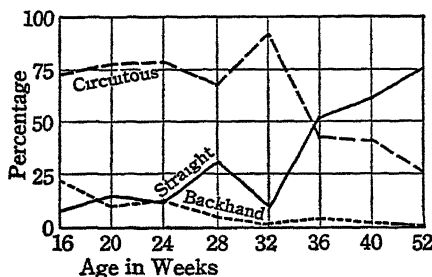


FIG. 56. DEVELOPMENT OF GRASPING

The percentage of straight, circuitous, and backhand reaching responses. (Halverson.)

²³ See Castner, in *Genetic Psychology Monographs*, vol. 12, pp. 105-193; and Halverson, in *Genetic Psychology Monographs*, vol. 10, pp. 107-286. Figs 55-57 are quoted from the latter by special arrangement with the publishers, The Journal Press,

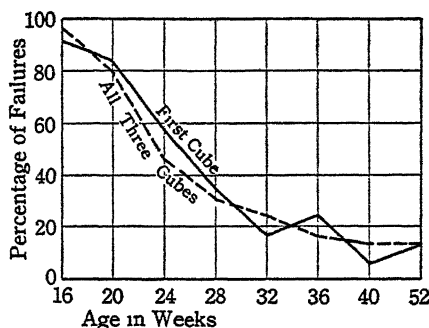


FIG. 57. DEVELOPMENT OF GRASPING

The percentage of failures to reach cube. (Halverson.)

months old, he has sufficient motor coordination to copy a horizontal or vertical line.

5. SPEED AND ACCURACY OF VOLUNTARY MOVEMENT

The speed and accuracy of voluntary movements cannot be studied satisfactorily in children under the age of four years. Before this time most children lack an adequate concept of time and hence of speed. They do not understand directions well enough or will not apply sufficient effort in following directions. For similar reasons, it is difficult to separate the voluntary and involuntary movements of the very young.

Speed of Voluntary Movement. Several types of voluntary movement have been investigated, of which *tapping* furnishes a good specimen.²⁴ All voluntary movements are complex, and even tapping is not so simple as it seems. Various measures of speed of tapping give different results. For example, Goodenough and Tinker used three methods with 32 kindergarten children whose ages averaged approximately five and one-half years. Finger-tapping was tested by twelve tests, each

²⁴ See Baldwin and Stecher, *Psychology of the Preschool Child*, chap. 4; Gilbert, *Studies from the Yale Psychological Laboratory*, vol. 2, pp. 44-100; Goodenough and Tinker, in *Journal of Genetic Psychology*, vol. 38, pp. 146-160; Pyle, *The Examination of School Children*.

TABLE 9. SPEED OF VOLUNTARY MOVEMENT. MEAN NUMBER OF TAPS
IN TEN SECONDS BY 32 KINDERGARTEN CHILDREN
(Goodenough and Tinker)

	FIRST TRIAL	SECOND TRIAL
Finger-tapping		
Right unimanual		
Index finger	28 1	31 4
Middle finger	27 3	28 4
Little finger	23 5	25 0
Left unimanual		
Index finger	23 3	24 4
Middle finger	22 3	23 6
Little finger	15 0	19 0
Right bimanual *		
Index finger	28 6	29 9
Middle finger	30 1	27 3
Little finger	23 8	23 4
Left bimanual		
Index finger	22 6	23 9
Middle finger	21 5	23 0
Little finger	14 5	14 5
Pencil-tapping		
Right unimanual	41 7	43 1
Left unimanual	38 8	39 4
Right bimanual	37 7	38 5
Left bimanual	35 8	35 5
Stylus-tapping		
Right hand	42 1	40 9
Left hand	39 8	37 8

* Bimanual means tapping with same finger on each hand at same time; the number of taps, however, was recorded separately.

lasting ten seconds. The results are shown in Table 9, from which it appears that the rate ranges from fifteen to forty-two taps in ten seconds. Accordingly, we must know the kind of test used if we would know the significance of the results.

The speed of tapping increases at a fairly uniform rate throughout childhood. As Figure 58 shows, the average number of taps in thirty seconds increases from 115 at the age of six to 160 at the age of twelve in the case of the right hand, and from about 100 to 140 for the left hand. The six-year-old taps about two-thirds as fast as the adult. The same general facts

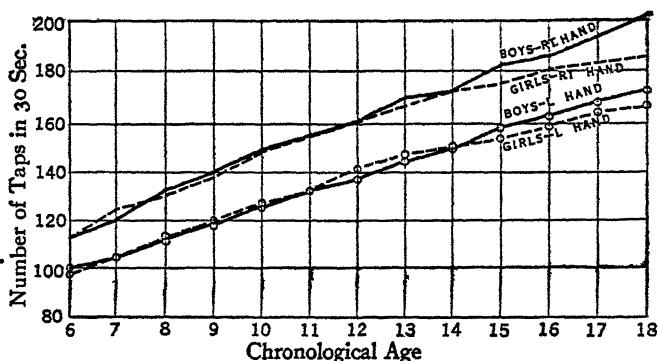


FIG. 58. VOLUNTARY MOTOR ABILITY; TAPPING THIRTY SECONDS
4197 boys; 4526 girls. (Pyle.)

are obtained by tests of tapping for a shorter period, as may be seen in Figure 59. In both cases speed increases from one-third to two-fifths between the ages of six and twelve. Sex differences in this function are slight although some studies show that girls have a small average superiority.

As nearly as can be determined from the meager experimental evidence, voluntary muscular movements involving the joints at shoulder, elbow, and wrist are nearer adult levels of development by the close of childhood than is speed of finger-tapping. We do not know with certainty the course of development of these larger muscle movements, but the evidence seems to indicate that it is similar to that of speed of finger movement.

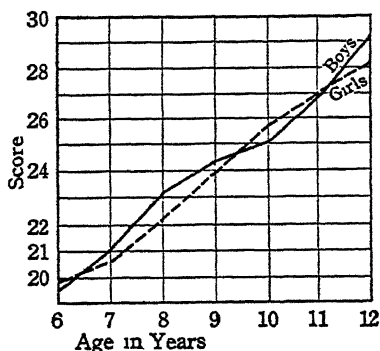


FIG. 59. RATES OF FINGER-TAPPING, FIVE SECONDS, AGES SIX TO TWELVE YEARS
(Bryan.)

The speed of other relatively simple skills indicates considerable motor development by the close of the pre-school period, especially when contrasted with the motor capacities of the in-

fant. The kindergarten children studied by Gates and Scott²⁵ were able to put an average number of eighteen marbles through a round slot into a box in thirty seconds' time.

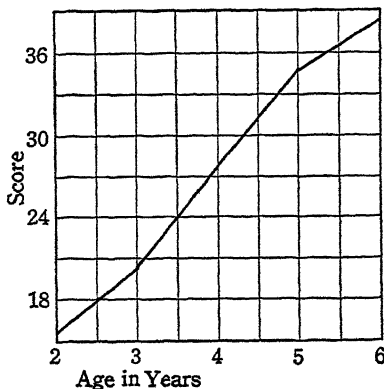


FIG. 60. SPEED OF FINE COORDINATED MOVEMENTS

(Baldwin and Stecher.) Putting metal stylus in small holes for one minute.

They also tapped alternately a painted cross and a classroom call bell for ten seconds, tapping the bell thirteen to fourteen times with the hand, nine to ten times with the index finger, and ten to eleven times with the foot.

Speed of Fine, Well-Coordinated Movement. The ability to make fine, well-coordinated movements has been tested in several ways.²⁶ On the whole, the results show rapid increases in these capacities during the pre-school years, as may be seen in Figures 60 and 61.

On one test²⁷ the children buttoned together two pieces of cloth, strips of flannelette, measuring three by six inches. The simplest test required the child to button one button; a second test required him to button two; a third test, four buttons. Not one of the children at eighteen months was able to button the one button, and only ten per cent of the two-year-olds could do it, but at thirty months eighty per cent were successful. The ability measured by the two-button test increased markedly from two and a half to three years, whereas the most rapid improvement on the more difficult four-button test occurred from three to three and a half years. (See Fig. 62.) On such a simple task as putting pegs in the holes in a board, children at thirty

²⁵ See *Journal of Genetic Psychology*, vol. 39, p. 451.

²⁶ See Baldwin and Stecher, *op. cit.*; Stutsman, in *Genetic Psychology Monographs*, vol. 1, pp. 1-67.

²⁷ Stutsman. *op. cit.*

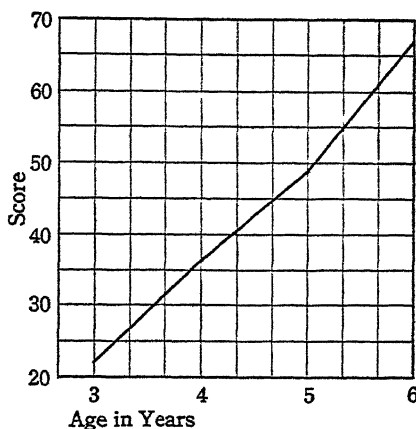


FIG. 61. MOTOR DEVELOPMENT SHOWN BY SCORES ON MONTESSORI BUTTONING FRAMES
(Baldwin and Stecher.)

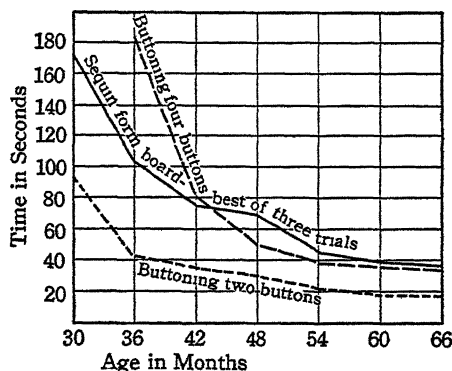


FIG. 62. SPEED ON PERFORMANCE TESTS
(Stutsman.)

months required approximately half as much time as at eighteen months.

Accuracy of Voluntary Movement. Precision or accuracy of voluntary movement has been measured by the familiar aiming and tracing experiments of the psychological laboratory as well as by several techniques devised especially for use with chil-

dren. In one aiming test, small crosses are drawn on a sheet of paper. The child tries to strike them with a pencil, using either the whole arm (from the shoulder) or the forearm (with elbow support). In another test, three small holes are arranged in a board. Back of them is a metal plate. The child attempts

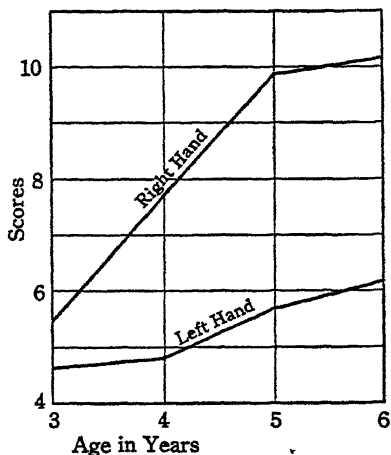


FIG. 63 INCREASE IN ACCURACY OF VOLUNTARY MOVEMENTS, AGES THREE TO SIX YEARS (Wellman.)

to thrust a metal stylus into each hole in turn. When he succeeds in doing so, the electrical circuit is closed, recording the number of successes in a specified time, which is his score. Wellman²⁸ used two tests to find out how much children improve in accuracy of movement during the pre-school years. The first test employed a tracing board, similar to that used in psychological laboratories, on which the person tested moves a pointed metal stylus down a gradually narrowing groove between two strips of metal.

Wellman arranged the apparatus so a buzzer sounded when the stylus did not touch the metal strips on the side of the groove. Little tots like to hear the buzzer, and this arrangement was necessary in place of the usual procedure for adults, in which the buzzer indicates touching. In the other test, two gradually converging straight lines were printed on a sheet of paper. The child traced a path with a pencil between these lines.

Other tests require children to trace a diamond, a Maltese cross or a four-pointed star, or to walk on a narrow board placed in a horizontal position four inches from the floor.

During the pre-school years, the child improves rapidly in accuracy of voluntary movement.²⁹ As Figure 63 shows,

²⁸ *The Development of Motor Coordination in Young Children.*

²⁹ Wellman, *op. cit.*; Baldwin and Stecher, *Psychology of the Preschool Child.*

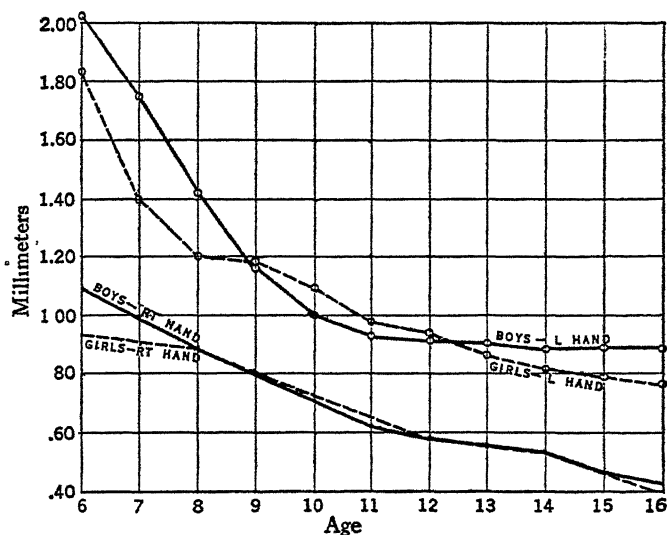


FIG. 64. PRECISION OF VOLUNTARY MOVEMENT
(Bryan.)

scores on the tracing-board test are almost twice as high at the age of six as at the age of three. Precision of voluntary movement, as measured by the aiming test, improves throughout childhood and on into adolescence.³⁰ Inaccuracy at the age of twelve is about half that at the age of six, as Bryan's data in Figure 64 show. Girls seem to excel boys in accuracy at the ages of six, seven and eight, but this conclusion is not sufficiently verified.

Steadiness of Motor Control. Steadiness of motor control has been measured in the laboratory by determining how much involuntary movement is present when the finger, hand, arm, or entire body is held as nearly motionless as possible. A common form of test uses a device in which several small holes are arranged in order of size in a metal plate. The child tries first to hold the point of a metal stylus in the largest hole for fifteen seconds without touching its sides. Then he tries the next largest, and so on. His score is the size of the smallest

³⁰ Bryan, *op. cit.*

hole in which he can hold the stylus for fifteen seconds without touching its sides. Improvement in this function takes place during childhood and adolescence, but reliable norms are lacking.³¹

6. MUSCULAR STRENGTH

The development of muscular strength in the child is an important index of motor maturity and is closely related to the way he adjusts himself to many problems and situations of life. The child who is physically weak, whose muscular strength is abnormally underdeveloped, often has greater difficulties in adjusting himself to the activities of other children than does the child whose muscular and physical capacities are normal.

Measuring Muscular Strength. Muscular strength is ascertained by using certain instruments which give accurate measures of the strength of the child's grip, of his back, of his

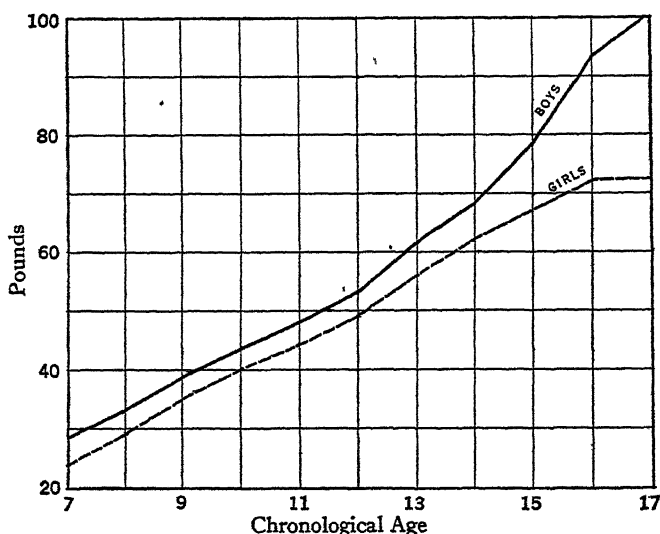


FIG. 65. STRENGTH OF GRIP, RIGHT HAND
(Baldwin.)

³¹ See Gesell, *Mental Growth of the Pre-School Child*, for an account of a steadiness test, known as the fish test, used with pre-school children.

legs, and of other important muscle groups. To measure strength of grip, the child is given a hand dynamometer which is adjusted to the size of his hand. He squeezes it as hard as he can, using each hand in turn. A scale indicates the number of pounds (or kilograms) he can grip. Other instruments measure strength of upper and lower back, strength of legs, etc. Such measurements cannot be taken very satisfactorily with young children because they do not understand the significance of the test and do not exert maximum effort.

Strength of Grip and of Upper Back. Strength of grip increases steadily throughout childhood and during the teens. (See Figure 65.) Boys at twelve can grip almost twice as much as at seven. At seventeen, they are almost twice as strong as at twelve. Girls' grips at twelve are twice as great as at seven, but at seventeen, only about fifty per cent more than at twelve. Boys are stronger than girls at all of these ages. The strength of upper back develops more rapidly from seven to twelve than does strength of grip. The development of this function is indicated in Figure 66.

Variability in Traits. Children of school age are more variable in muscular strength than in height, chest girth, head circumference, and other similar anatomical measurements.³² Breathing capacity, weight, and muscular strength are likely

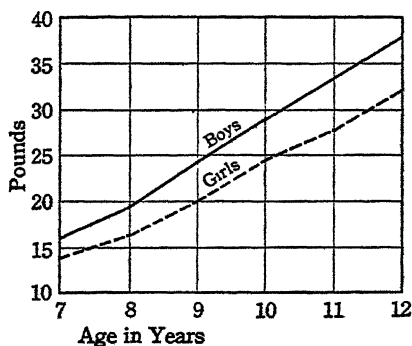


FIG. 66. STRENGTH OF UPPER BACK, AGES SEVEN TO TWELVE YEARS
(Baldwin.)

³² Baldwin, *Physical Growth of Children from Birth to Maturity*.

to show larger coefficients of variation,³³ than stature or circumference of head or chest. In general, the more static measurements (e.g., height) are less variable, while the more dynamic functions (e.g., strength) are more variable. This seems to be a general biological principle of some value.

The Ratios of Strength to Height and Weight. During each year from seven to twelve, as well as on into the teens, the child's strength increases more rapidly than his height or weight.³⁴ The ratio of boys' strength to height usually is greater than that of girls. The strength of boys is much more closely related to their weight and a little more closely related to their height than in the case of girls.

Muscular Strength Influenced by Environmental Conditions. The child's muscular strength and endurance are highly modifiable by many environmental conditions. The most important of these are the kind and amount of exercise, sleep and rest, fresh air, sunshine, and nutrition. The effects of exercise upon the muscles and upon muscular strength are well known. According to Burton-Optiz,³⁵ "When exercised, the skeletal muscle acquires new cells." The effects of adequate sleep, rest, fresh air, sunshine, and suitable diet are also well known. Parents and others having the care of children should see that adequate provision is made for these factors. Where parents are unable to do so, other agencies of the community must assume the obligation. The child who is denied these fundamental conditions for optimum development may be seriously handicapped by unsatisfactory progress on the road to maturity and to happy, healthful living.

7. COMPOSITE MOTOR ABILITIES

In addition to the tests of relatively simple motor abilities such as strength of grip and speed of tapping, so far described,

³³ The coefficient of variation is a statistical measure used especially to render comparable variabilities which are measured in different units (as feet, pounds, etc.) or are measured about different central tendencies. The Pearson coefficient of variation is found by dividing 100 times the variability (e.g., standard deviation) by the central tendency (e.g., arithmetic average).

³⁴ Baldwin, *op. cit.*

a number of measures have been devised for more complex motor abilities. These performances require the use of strength, agility, balance, and skill in lifelike situations and may be thought of as composites of the simpler motor aptitudes.

Composite Motor Abilities in Pre-School Children. The pre-school years are notable for the development of a wide variety of motor abilities of the more complex sort. These may be measured by developmental scales, in which controlled situations are presented to children of various ages, and their successes or failures recorded. Cunningham ³⁶ has worked out a tentative scale to measure the motor development of infants and young children which includes many items such as the following:

Twelve Months Tests

- To remove a paper cap from head.
- To walk with help.
- To stand supporting self.
- To tap a small bell.
- To remove a hoop from knees.
- To obtain a toy from the second step (of a small stairs).

Eighteen Months Tests

- To walk without help.
- To obtain a toy from step 3.
- To get off stool. Infant seated on stool 10 inches high.
- To climb 3 steps.
- To climb upon low box.
- To slide or back down 3 steps.

Twenty-four Months Tests

- To get off chair, height 13 inches.
- To climb upon chair, height 17½ inches.
- To roll a rubber ball half way up an incline, 3 feet, 8 inches long with six-inch elevation.
- To throw a bean bag into a twelve-inch hole after practice.
- To roll a bowling ball 9 feet and over a small obstacle.

Thirty Months Tests

- To throw a bean bag into hole at 3 feet, twice with three trials.
- To walk up eight-foot flexible plank elevated 8 inches at upper end.
- To roll a ball up an inclined board 3 feet, 8 inches long.

³⁶ *Journal of Educational Psychology*, vol 18, pp. 458-464. Quoted by special arrangement with the publishers, Warwick and York, Inc., Baltimore.

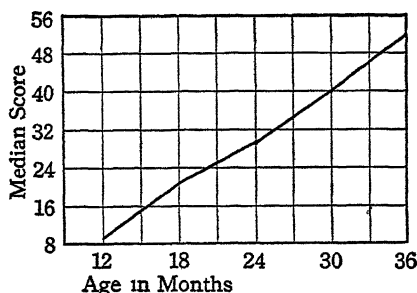


FIG. 67. MOTOR DEVELOPMENT, AGES TWELVE TO THIRTY-SIX MONTHS
(Cunningham)

To walk upon two parallel $4 \times 4 \times 4$ inch beams 6 feet long placed 8 inches apart. (Scored correct if child does not step off.)

To walk on double diverging beams without stepping off. Beams 4 inches apart at narrow end, 12 inches apart at wider end.

Thirty-Six Months Tests

To throw a soft ball into a basket from a distance of three feet (elevation of basket, 3 ft.)

To walk on $4 \times 4 \times 4$ beam without stepping off more than twice.

To walk up steps without support.

To jump with two feet from eight-inch elevation.

To throw hoop onto rod from distance of 3 feet, rod elevated 3 ft.

Tests Too Difficult at Thirty-Six Months

To jump with two feet over hurdle $3\frac{1}{2}$ inches high.

To hop on one foot.

The improvement from the age of twelve months to thirty-six months in score on these tests is enormous, as may be seen from Figure 67.

Complex Motor Abilities of School Children. A great number of complex motor abilities are found among older school children. Brace³⁷ used twenty tests which measure a wide range of them. Four of these (Nos. 10 to 13) are given to show the general nature of the scales.

³⁷ Brace, *Measuring Motor Ability*. Copyright, 1927, by A. S. Barnes & Co., New York. Quoted by special arrangement with the publishers.

Hold the toes of either foot in the opposite hand. Jump up and jump the free foot over the foot that is held, without letting go.

Jump into the air and slap both heels with the hands behind the back.

Stand, kick the right foot up so that the toes come at least level with the shoulders. Do not fall down on the floor.

Stand on the left foot. Bend forward and place both hands on the floor. Raise the right leg and stretch it back. Touch the head to the floor, and regain the standing position without losing the balance.

These tests are scored by recording the number of points gained. Improvement for several hundred boys and girls was especially rapid from age nine to age twelve, according to the data of Figure 68.

Other Tests of Motor Abilities. A wide variety of tests has been devised to measure many other kinds of motor ability.³⁸ The child's ability to follow rhythm in music can be tested by

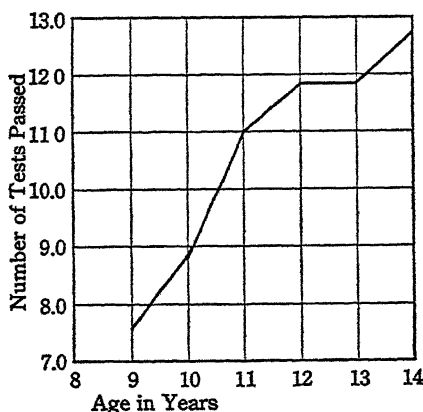


FIG. 68. INCREASE IN MOTOR ABILITY SHOWN ON THE BRACE MOTOR ABILITY TESTS
(Brace.)

³⁸ For a description of such tests, see the following: Baldwin and Stecher, *Psychology of the Preschool Child*, pp. 74-105; Montessori, *The Advanced Montessori Method*, p. 464; Stutsman, *Genetic Psychology Monographs*, vol. 1, pp. 1-67; Whipple, *Manual of Mental and Physical Tests*.

having him strike two blocks together in time with the music. When the blocks come together an electric circuit is closed and the contact is recorded on a recording drum. A much less accurate test is to have the child beat time to the music and to observe how well he does it or how many errors he makes. Hand and arm coordinations may be tested by using the tracing board and by various aiming and steadiness tests which have already been described.

Another type of tests is used to measure motor learning — to find out how well the child can form motor habits. In many of such tests, however, the motor skill is so complex that much time is required to secure adequate learning curves. This is particularly true of such things as learning to toss small rings over a peg at a specified distance, throwing basketball goals, shooting arrows at a target, throwing a ball at a target, type-writing, sending and receiving telegraph messages, and other complex motor acts. Many learning experiments of this kind have been made.³⁹ A very simple way to measure the child's ability to form a new motor habit is by using the mirror-drawing test. The child is required to trace with a pencil a large star which is printed on paper. The test is arranged in such a way that the child can see the star, his hand, and the pencil only by looking in a mirror where all his movements are reversed. Thus he has to form new eye-hand coordinations. The test is easy to give and requires only a few minutes.

8. MUSCULAR FATIGUE

By muscular fatigue is meant the decrease in the amount of work done in a given time as a result of continuous work.⁴⁰ The evidence at hand⁴¹ indicates that children from ages six

³⁹ See standard textbooks on Educational and Experimental Psychology and Psychology of Learning for descriptions and results of such investigations.

⁴⁰ For a discussion of the ways to measure continuous work and the significance of the resulting curves see Thorndike, *Educational Psychology*, vol. III, Chapman, *Psychological Review*, vol. 32, pp. 224-234; Peterson, *Journal of Experimental Psychology*, vol. 2, pp. 178-224; or any standard work on Experimental Psychology.

⁴¹ Gilbert, *op. cit.*

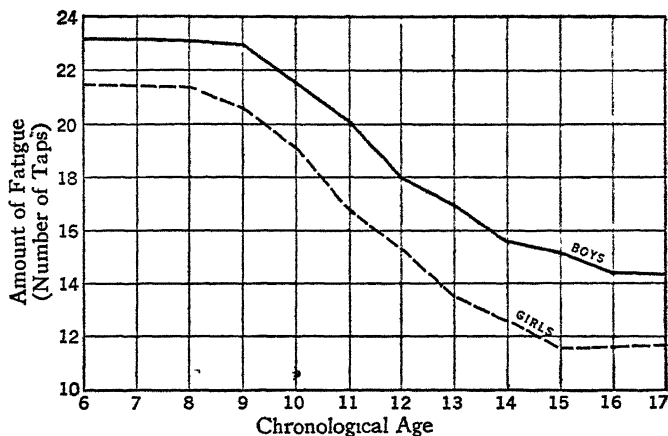


FIG. 69 FATIGUE FROM FORTY-FIVE SECONDS' TAPPING
(Gilbert.)

to nine are about equally prone to fatigue. From nine to twelve years of age they do not fatigue so readily, the decrease in amount of fatigue being greater during these years than during any other three-year period between the ages of six and seventeen. (See Fig. 69.) We should hasten to add, however, that Gilbert measured muscular fatigue in the case of forty-five seconds of tapping, and one must be cautious in generalizing from experiments which involve such a simple motor function. Muscular fatigue is difficult of measurement at any age, but the difficulties are almost insurmountable at the earlier ages. The young child's interest flags; he may be bored by an activity and want to do something else; the result is a decrease in his motor efficiency. Unless maximum effort is put forth the decrease in efficiency may be caused by both fatigue and by the lack of effort which follows loss of interest. Under such circumstances it is impossible to separate the effect or amount of fatigue.

9. NATURE VS. NURTURE IN THE DEVELOPMENT OF MOTOR CAPACITIES

Does the child's motor development result from maturation or from training? Is it possible, through training or practice, to raise the child's level of motor ability above that which he would attain in the normal process of growth? Here we have the age-old problem of nature vs. nurture.

An inherent difficulty in studying this problem lies in the fact that we cannot both train the same child in order to discover the level to which he will rise by a certain age, and also withhold training during this period to see the level to which he would rise without special exercise. Accordingly, the method commonly used is to train some children (known as the experimental or practice group) and not train others (the control group). Care is taken that the two groups are equivalent in any abilities that may affect the results. Securing equivalent groups, however, is difficult in proportion as one is highly critical in seeking great accuracy. Gesell's method of co-twin control secured a better approximation to equivalence than usually is obtained, yet he observed a personality difference between the "identical" twins which he thought significant in interpreting his results. Even a short sick spell seemed to upset the equivalence. Usually many children are included in each of the "equivalent" groups. Sickness, or any conditions producing lack of interest and effort on the part of any children, usually are either unknown or disregarded. The large number of children is expected to allow the operation of chance in such a way as to render vitiating factors equal for the two groups. Sometimes an investigation becomes almost worthless because entirely too much of the study has been left to chance.

Besides Gesell and Thompson's work with the pair of twin girls, a few other significant attacks have been made on this problem. The authors of these studies, for the most part, conclude that maturation and a general environment which offers many possible experiences are more effective than systematic

practice.⁴² The differences between practiced and unpracticed groups in these experiments are small and, statistically considered, have little significance. We cannot be too sure, however, that they indicate conclusively the great rôle that maturation plays in the motor development of young children. It is possible that the differences may be more reliable than the law of chance would lead us to believe, because the law of chance presupposes that samples drawn in the same way are alike except for sampling errors. Drawing specified samples of children is vastly more complex than throwing dice, drawing cards, or tossing coins.

After a careful study of twenty-five babies during the first two years, Shirley discusses three hypotheses or theories of motor development — maturation, learning, and talent. She says,⁴³

The maturation theory still leaves unaccounted for the large individual differences in motor development and motor interests. For ages people have known that certain traits run in families. Animal breeders have never questioned that traits can be bred in or out of stock. A predisposition or talent for music or art has long been postulated to account for differences between genius and mediocrity in those lines, and mechanical skill has recently been looked upon as a natural gift rather than as the product of training alone. Is it not possible that a tendency to good motor co-ordination is a talent also? Great athletes might ascribe their prowess to long years of systematic training, but a good jockey would never train a draft horse for racing.

Motor talent, maturation, and learning all seem to play a part in the motor development of the child. Any emphasis upon the importance of talent and maturation as determining factors does not warrant neglecting to give children suitable training and favorable opportunities for practice in developing necessary skills. Those having much motor talent, however,

⁴² See Gates and Taylor in *Journal of Educational Psychology*, vol. 17, pp. 226-236, Hicks, *The Acquisition of Motor Skill in Young Children*; Hilgard, in *Journal of Genetic Psychology*, vol. 41, pp. 36-56; and Jersild, *Training and Growth in the Development of Children*.

⁴³ *The First Two Years*, vol. 1, p. 177. Minneapolis, University of Minnesota Press. Quoted by special arrangement with the publishers.

will most readily acquire high degrees of skill. Such children can reach levels of attainment beyond the possibilities of those having average or mediocre motor talent.

SELECTED REFERENCES

Dawson and Stoddard, in *Review of Educational Research*, vol. 3 (April, 1933), pp. 148-149, and Wellman, in *Review of Educational Research*, vol. 6 (February, 1936), chap. 3, give critical reviews of the literature on motor development and give extensive bibliographies to recent research on this subject.

Buhler, in *The First Year of Life*, chaps 6, 9, and 10, gives data and discussions on spontaneous reactions and a summary and analysis of forms of behavior until the age of twelve months; Gesell, in *The Mental Growth of the Pre-School Child*, chap. 8, gives norms of motor development from four months to sixty months of age, and in chaps 16-25, makes comparisons of the developments (including motor) of children of various age groups. Shirley, in *The First Two Years*, vol 1, *Postural and Locomotor Development*, chaps. 3-6, 10, 11, discusses locomotor development of children during the first two postnatal years; in vol. 2, *Intellectual Development*, chaps. 2 and 3, she gives data on fine motor coordination and the motor sequence during the first two years; Stoddard and Wellman, in *Child Psychology*, chap. 3, give a critical discussion of motor development; Wagoner, in *Development of Learning in Young Children*, chap 7, discusses learning to control the body; Woodworth, in *Psychology* (third edition), pp 166-176 gives a very readable account of motor development.

Additional references are given at the end of this volume.

CHAPTER VII

LANGUAGE

THE use of language is the most characteristically human of all psychological functions. From an early age to maturity, the child is constantly increasing his facility in linguistic performances. Everything that he learns subsequently is dependent in some degree on his command of language. Not only does his school achievement require verbal ability, but all of his traits of personality and character are greatly affected by processes of learning which operate through speech.

For many years much interest has been given to the way in which the child acquires language. Most of the earlier studies were biographical, consisting of descriptions of a single child's language during the first two, three, or four years of life.^{*} More recently better techniques have been invented, and larger numbers of children have been subjected to careful studies.

I. HOW LANGUAGE IS LEARNED

It is obvious that speech and other higher linguistic accomplishments are learned acts. The acquisition of language offers an excellent example of how the general principles of learning operate in childhood. It is also important to emphasize that the development of children's language, to be described at length in a subsequent section, is one long and continuous learning process.

Learning to Imitate. The uncritical observer is likely to place the start of language development at the stage in which

^{*} Good summaries of these accounts may be found in the following: Bateman, in *Pedagogical Seminary*, vol. 24, pp. 391-398; Doran, in *Pedagogical Seminary*, vol. 14, pp. 401-438; Grant, in *Pedagogical Seminary*, vol. 22, pp. 183-203; Magni, in *Pedagogical Seminary*, vol. 26, pp. 209-233; McCarthy, in *Psychological Bulletin*, vol. 26, pp. 625-651; Pelsma, in *Pedagogical Seminary*, vol. 17, pp. 328-369.

the young child imitates sounds. An adult says, "boo," and the twelve-month-old infant says, "boō," after him. At one time this was regarded as an entirely native performance, and an "instinct of imitativeness" often was ascribed to young children.

It is an error, however, to start a description of the development of language with imitation. An important step of learning has already been achieved when this stage is reached. The real beginning is found in the fact that the infant makes ran-

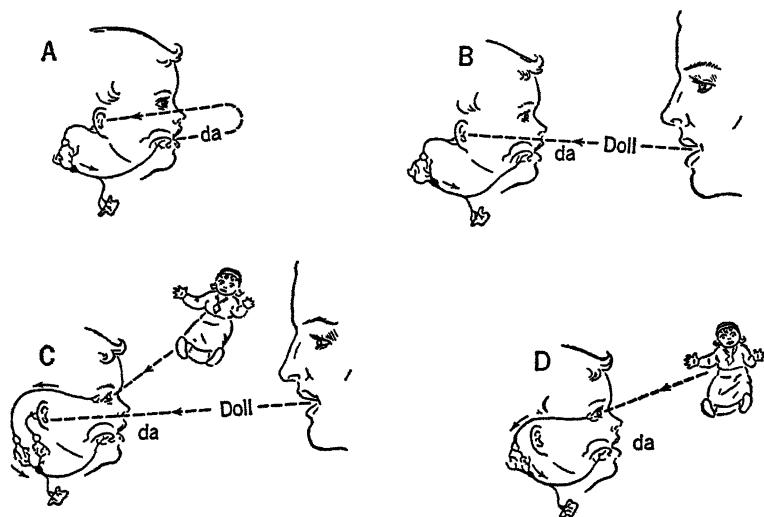


FIG. 70. DEVELOPMENT OF LANGUAGE HABITS IN THE INFANT
(Allport.)

A, Stage 1.—Random articulation of syllables with fixation of circular responses. Chance articulation of the syllable *da* causes the baby to hear himself say it. The auditory impulse is conveyed to the brain centers where it discharges into the efferent neurons to muscle groups used in pronouncing the same syllable. An ear-vocal habit for *da* is thus established.

B, Stage 2.—Evoking of the same articulate elements by the speech sounds of others. An adult speaking the word "doll," which is closely similar to *da*, causes the auditory excitation again to discharge into the response *da*.

C and D, Stage 3.—Conditioning of the articulate elements (evoked by others) by objects. In *C* the process shown in *B* is repeated. A doll shown at the same time stimulates the baby's eye, and forms a visual connection with the motor neurons being used in pronouncing the syllable. There is thus established a conditioned response between the sight of the doll and the speaking of *da*. The sight of the doll alone (*D*) is now sufficient to evoke its name (*da* being as close as the baby can come to the pronunciation

dom vocalizations as part of his general reactions to a variety of stimuli. At this stage, these vocal responses are not elicited by any specific situations, but are part of general mass activity. If, in this way, the infant says "da," he simultaneously hears himself say it. The necessary arrangement for learning by the conditioned reaction is thereby effected. By saying "da" many times, each time accompanied by an auditory impression of his own voice, the child learns the connection between a sound and a complex vocal motor act.² This is shown in *A* of Figure 70. The fact that the child learns the imitative or "hear-say" reaction by hearing his own voice is verified by the common observation that young children tend to repeat a syllable many times. Once started, the reaction continues under self-stimulation. It is also noted that deaf children do not learn to talk in the normal manner, being denied this early necessary preparation.³

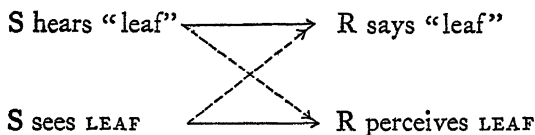
When a child has learned to imitate himself, an adult can participate in the process. If the child says a syllable and an adult repeats it or says a word approximating the syllable (*B* of Fig. 70), the auditory stimulus is sufficiently simultaneous with the motor response to effect a conditioning. It is to be noted that at this stage the child does not learn by imitating an adult. Instead, he learns because the adult first imitates him! At no time during the development of language can a child imitate an essential sound element that he has not already made in the course of his spontaneous vocalizations.

Learning the Names of Things. When a child has mastered the "hear-say" reaction, he begins acquiring a vocabulary! This process is shown in Figure 70, *C* and *D*. The operation of the conditioned reaction form of learning is here even more evident. When an object, such as a leaf, is presented, the child perceives its form, size, weight, color, and possibly also its

² The theory of the learning of this reaction is developed by Allport, *Social Psychology*, chap. 8; Holt, *Animal Drive and the Learning Process*, chaps. 7 and 13; Smith and Guthrie, *General Psychology in Terms of Behavior*, p. 132.

³ Allport, *op. cit.*, pp. 185-186.

source. If simultaneously the word is spoken, this conditioning occurs:



Learning takes place in both directions indicated by the dotted lines. On seeing a leaf in the future, the child is likely to pronounce the word, and on hearing the word, he is likely to reinstate some of his experience from the actual presence of the object. Thus the meanings of words are learned by hearing them in conjunction with the things, events, or relationships that they signify. The word becomes a substitute stimulus for a certain reaction, and this response is the *meaning* of the word.

All of the phenomena characteristic of the conditioned reaction may be seen in connection with word-stimuli. At first the response is broad and generalized. If the child has learned the meaning of "kitty," all dogs, squirrels, and even fur scarfs are called "kitty" also. Exactly the same thing psychologically is the tendency of young children to call all men "daddy," sometimes embarrassingly. Later, differentiation is achieved with further repetition, as in the case of other conditioned reactions, and the word becomes more specific to its proper meaning.

Trial and Error in Verbal Learning. It is not to be supposed that the child learns the pronunciation or meanings of words correctly and mechanically on the first repetition. When exercising the imitative reaction, the infant may respond to "kitty" by "ticki," "kicki," and by other approximations until he arrives at a more certain pronunciation. At higher levels, errors of meaning, spelling, and of grammatical usage occur, as the child coordinates his self-initiated activity with external demands and rewards.

In this phase of linguistic learning, as in all others, progress is from that which is total and undifferentiated to that which

is particular and specific. The acquisition of language thus illustrates many of the general laws of development.

2. THE FUNCTIONS OF LANGUAGE

Children's Uses of Language. The uses or functions for which children employ language is another phase of linguistic development that has been investigated extensively. The functions of language as used by adults have long been subjected to various classifications. The grammarians, for example, classify sentences as declarative, interrogative, imperative, and exclamatory. These categories may be useful in the analysis of adult language, especially if it is written, but a more flexible and less formal classification is more suitable in the case of children.

The method by which the functions of children's language have been investigated is to record their remarks verbatim, with sufficiently complete notes on the context to identify the situations to which they were responding. The units of language, sentences or short groups of sentences, are then analyzed and classified.⁴ A good example of a study of this type is that of Rugg, Krueger and Sondergaard. The conversation of twenty-seven kindergarten children was recorded in full for three fifteen-minute periods. The situations were varied, including outdoor play, a classroom work period, and a luncheon discussion. Altogether 3125 "remarks" were carefully recorded, and the analysis was made which appears in Table 10. It is notable that the most important classification is "self-assertion." These children do not use language chiefly to communicate or to attain social ends, but to express personal power, to call attention to self-display, to command, request, and contradict.

⁴ Adams, in *Journal of Juvenile Research*, vol. 16, pp. 269-277; Day, in *Child Development*, vol. 3, pp. 179-199; Fisher, in *Journal of Experimental Education*, vol. 1, pp. 50-85; Johnson and Josey, in *Journal of Abnormal and Social Psychology*, vol. 26, pp. 338-339; McCarthy, *The Language Development of the Preschool Child*; Piaget, *The Language and Thought of the Child*; Rugg, Krueger and Sondergaard, in *Journal of Educational Psychology*, vol. 20, pp. 1-18; Smith, *An Investigation of the Development of the Sentence and the Extent of Vocabulary in Young Children*; and Snyder, in *Pedagogical Seminary*, vol. 21, pp. 412-424.

TABLE 10. CHILDREN'S USES OF LANGUAGE. THE CLASSIFICATION OF 3125 REMARKS MADE BY 27 KINDERGARTEN CHILDREN*

CLASSIFICATION	NUMBER	PER CENT
I. Self-assertion	1275	40 8
II. Self-depreciation	8	25
III. Evidences of social consciousness	116	3 7
IV. Verbalized perceptions	259	8 3
V. Linguistic experimentation	188	6 0
VI. Dramatic play	148	4 7
VII. Questions	311	9 95
VIII. Rational thought	193	6.2
IX. Statements of fact	500	16 0
X. Answers of "yes" and "no"	127	4 1
Total	3125	100

* Rugg, Krueger, and Sondergaard. Quoted by permission of Warwick and York, Inc., publishers

Considerable insight into child personality is obtained from these results, as well as direct data on language.

Egocentric and Socialized Speech. Piaget, a pioneer in research of the kind here considered, attempted to classify all of children's speech as egocentric or socialized. In egocentric speech the child is not talking to anyone; his talking is merely a self-centered activity. Several children may be seen playing together with toys and all talking at the same time, each paying no attention to the others. They are together while talking and playing, but they are not playing together or talking to each other. They are like Sir Francis Galton's figurative ox — gregarious, but not social.

Socialized speech is usually regarded as a more mature stage in language development. In this manner, the child really communicates with others, although much of his conversation may still be self-assertive. He asks questions, answers questions, argues, objects to suggestions, agrees to do things, and tells other children what to do or what not to do.

The proportion of egocentric and socialized responses in children's conversation has been investigated with much care. In analyzing 1500 remarks of two children six and one-half years old, Piaget found 38 per cent of egocentric and 45 per cent of spontaneous socialized elements. McCarthy, on the

contrary, found only 4 per cent of egocentric responses in the conversation of a larger number of children of a similar age. It is probable that these large variations are due to difficulties in maintaining uniform classifications, to the effects of different situations on the children, and to variations in the personal characteristics of the children used as subjects. It is generally agreed that the number of egocentric responses tends to decrease as the child grows older.

3. STAGES IN LANGUAGE DEVELOPMENT

At the present time the following stages in the language development of the child are commonly recognized: (a) early vocalizations, (b) comprehension of language, (c) the first word, (d) the single-word sentence, and (e) longer sentences of increasingly complex structure. An examination of each of these stages in order will show the child traveling the road to language maturity.

Early Vocalizations. The earliest vocalization of the newborn is the birth-cry, about which many poetic, sentimental, or pessimistic lines have been written. We are not interested in these interpretations now. The birth-cry results from the air passing rapidly over the vocal cords. It probably is a reflex,⁵ and has no emotional significance or intellectual meaning. Some observers of infants⁶ have noted other cries and sounds during the first two weeks, particularly a sort of grunt, given in voice tones which resembled the vowel *n* or broad *a* followed by *ng*. Certain cries or vocalizations also have been described, such as those indicating uncomfortable conditions, hunger or fatigue, and those of actual pain. Other writers attach no definite significance to these sounds, regarding them merely as reflexes which do not express meanings. In support of this latter view, observers have noted that the cry of colic is the only vocal response which does not occur under many different con-

⁵ See Blanton and Blanton, *Child Guidance*.

⁶ See, for example, Bean, in *Journal of Genetic Psychology*, vol. 40, pp. 181-204; Shirley, *The First Two Years*, vol. 2.

ditions. Any other vocalization appears now under one set of conditions and again under other conditions. These early vocalizations of the babbling or pre-linguistic stage have been studied carefully⁷ to determine the sequence of the child's vocal development. The limits of space do not permit summaries of all of these studies.

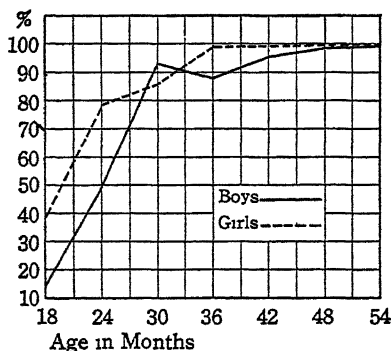


FIG. 71 PERCENTAGE OF CHILDREN'S RESPONSES WHICH WERE COMPREHENSIBLE, AGES EIGHTEEN TO FIFTY-FOUR MONTHS

(McCarthy. *N* = 140.)

At the age of a year and a half approximately one-fourth of a child's vocalizations can be understood. At two years, two-thirds are comprehensible, at three years, nine-tenths, and at four years, 99.6 per cent. (See Fig. 71.)

Language Comprehension. Another important phase of development relates to the child's understanding the language of other persons. A child understands the language he hears long before he can produce active oral language. This suggests the later difference between the passive and active vocabularies, which is discussed in the next section. We probably should discount some of the earlier reports made by parents on their children's early language comprehension, for their judgments

⁷ See McCarthy, in *Psychological Bulletin*, vol. 26, pp. 625-651; Shirley, *op cit.*, pp. 48 ff.; Wellman, Case, Mengert, and Bradbury, *The Speech Sounds of Young Children*.

⁸ See, for example, McCarthy, *op cit.*, p. 51.

often were subjective and inaccurate. More recently, excellent objective observations have been made.⁹

Gesell's Norms for Language Comprehension. Gesell, at the Yale Child Development Clinic, has carried on extensive researches on the development of language comprehension in young children. He has found that a half or more children at nine months can make motor adjustments to certain words which indicate some degree of comprehension of the questions asked. They can make responses such as to look in answer to the question, "Where is the kitty?" or to put up the hands in answer to the question, "How big is the baby?" When children eighteen to twenty-four months of age are tested, larger proportions of the older ones are found to be able to point out an object in a relatively simple picture in answer to a request such as, "Show me the shoe." From two to three years of age, children develop the ability to understand oral directions to put a ball on a box, to put it in the box, to put it behind a box (or chair), to put it in front of the box, or under a chair. At the age of twenty-four months from two-thirds to four-fifths of the infants can perform two of these tasks correctly. By the age of thirty-six months, approximately the same proportion can do three of them correctly. At the four-year level, Gesell had the child look at a picture of a boy blowing soap bubbles, and asked, "What is the boy doing?" After some further instructions and explanations the child is asked to draw one bubble under the chair, two above the boy's head, three behind the boy, four in front of him. Nine-tenths of Gesell's four-year-olds placed the bubbles *under* and *above* correctly and approximately one half of them could execute correctly all four commands.

The First Word. Fond parents, eager for the child to learn to talk, are prone to regard the chance vocalizing of some word as true language, especially if it happens to occur when an object or person is present to which the sound might refer. Thus,

⁹ See Gesell, *The Mental Growth of the Pre-School Child*; Smith, *op. cit*; Van Alostyne, *The Environment of Three-Year-Old Children: Factors Related to Intelligence and Vocabulary Tests*.

a tiny tot's proud parents were sure the little fellow knew "dada," and told their neighbors and friends about it. When the infant was to show his repertoire to some guests, however, all did not go so well. To the question "Who's this?" when his father came near, he said "dada." He also said "dada" to his mother, to each of the guests, and to the cat. He then picked up some of his toys, banged them together and gleefully said, "dada." One cannot be sure about the child's first word, because so many variable conditions help to determine it.²⁰ Some observers report "mama," "baby," "see," and several others as first words used by different babies. By the time, however, that he is a year old, the normal child is likely to have two or three words in his active oral vocabulary.

The Development of Word Meanings. Objects, events, persons, and all situations, simple or complex, have meaning for the child because of his experiences with them. In early infancy, he pushes, pulls, strikes, tastes, rubs, twists, sees, hears, smells, lifts, throws, drops, or rolls everything that he can. All of the actions that he can do to objects, and all of the effects that they have upon him, give these objects meaning. As he learns words for objects, in the manner described in the preceding section, his word meanings tend to reflect the essential activity-meanings previously acquired. This is seen in the "definition in terms of use" that is typical of early childhood. If a child of four or five years of age is asked the meaning of a chair, a car, a hoe, and a shoe, he is most likely to answer, "A chair is to sit on," "A car is to ride in," "A hoe is to dig with," "You put shoes on your feet." The meanings of words thus involve all of the possibilities for action.

It may be assumed with considerable certainty that a child can comprehend words that he uses in his own speech or that he can define. He also understands many words that he does not use or define. If two curves could be drawn representing, first, the development of spoken language, and second, the development of language understood when heard, these graphs

²⁰ See, for example, Lorimer, *The Growth of Reason, A Study of the Verbal Activity in the Growth of the Structure of the Human Mind*.

would probably spread farther apart as the child grows older. Accordingly, the child's comprehension of language is undoubtedly greater than that shown in Figures 72 and 73.

A very powerful incentive to oral speech is added when the young child finds that by telling his wants, he can make other people serve him. The words "water" and "drink" become more important to him when he discovers that through them he can evoke help to accomplish something that he could not do by himself.

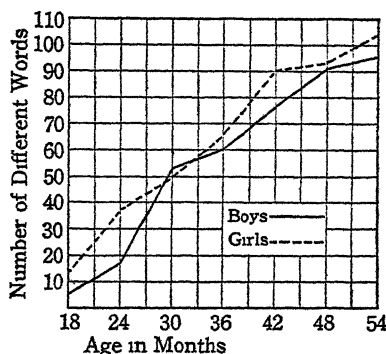


FIG. 72. AVERAGE NUMBER OF DIFFERENT WORDS USED BY CHILDREN AGES EIGHTEEN TO FIFTY-FOUR MONTHS
(McCarthy. $N = 140$.)

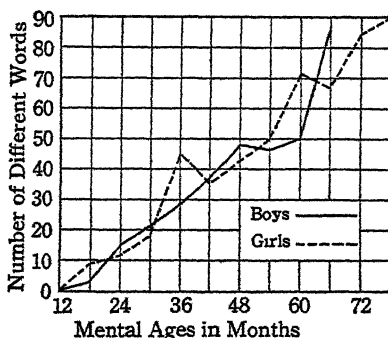



FIG. 73. MEAN NUMBER OF DIFFERENT WORDS USED BY CHILDREN
Mental ages from twelve to seventy-eight months. (C.A. from
eighteen to fifty-four months.) (McCarthy. $N = 140$.)

The Word Sentence. The child very early uses one word as a sentence. The way in which he says a word, the inflection and the gestures, convey his meaning. Thus he may say "Ball" in a lusty eager manner pointing toward a ball on the floor outside his pen, and the mother hands him the ball, or, if he has been poorly trained, he may whine the word as he points toward the object he desires and thus secure it. Many observers have called attention to the fact that the child's first meaningful utterances are not words as such, but are really sentences, usually referred to as the sentence-words or single-word sentences. Tone, inflection, gesture, and posture help make the word a sentence. Thus, when the child says "Ball," he may mean, "Give me the ball," "Let's play ball," "I have a pretty ball," "I like my ball," "This is my ball," or any one of several other possible meanings. 

The Sentence. Soon the child's language ability carries him beyond the sentence-word, and we find him using two words together appropriately. Some children can do this by the age of eighteen months. By the age of two years, half or more of normal children can do it. A few children by the age of two years use pronouns, such as I, you, and me, correctly. By the age of three years, approximately 75 per cent of them do so, providing appropriate language experience at home is not lacking. By the age of four years less than one-half of normal children can define four of the following words by use:¹¹ chair, horse, fork, doll, pencil. By the age of five years, approximately 75 per cent can do so. A few children at eighteen months can name one object¹² in a picture. At three years a few normal children use one or more descriptive words. At five years of age a few can describe a simple picture.

*Length of Sentences Used.*¹³ The average number of words used in a sentence is a good measure of the child's growing use of language and is particularly valuable for tracing develop-

¹¹ See Gesell, *op. cit.*, p. 92.

¹² See Gesell, *op. cit.*, chap. 9 for a full discussion of other language tests.

¹³ See Day, in *Child Development*, vol. 3, pp. 179-199, 298-316; McCarthy, *op. cit.*; and Smith, *op. cit.*

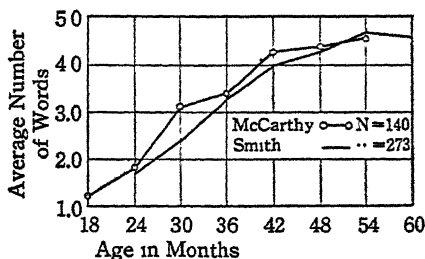


FIG. 74. AVERAGE NUMBER OF WORDS IN CHILDREN'S RESPONSES

ment up to the age of four or four and a half years. The number of words in a sentence increases from an average of 1.2 at the age of eighteen months to approximately 4.6 at four and a half years, as Figure 74 shows. Of course some sentences will be longer and more complex, depending upon the child's mental ability, on his language environment, and on the particular occasion calling out the language response. A little girl of four and a half years had been reprov'd by her mother for using some slang word. Her mother had told her that if she used such words other parents would not let their children play with her. This was a very serious problem, because she liked very much to play with several young neighbors. After some thought she said, "Mother, if you had another little girl, and I was somebody's else's little girl, and I said that word, would you let your little girl play with me?"

*Sentence Structure.*¹⁴ Studies of the types of sentences, of the ways in which words are combined, are another means of appraising the child's language development. As the child gets older he uses a more mature type of sentence. According to McCarthy,¹⁵ a number of changes in sentence structure typically occur between the age of eighteen months and that of four and a half years. Functionally complete but structurally incomplete sentences become relatively less frequent during this period. More simple sentences are used at first, but later, sim-

¹⁴ See *Twenty-Eighth Yearbook* of the National Society for Study of Education, for a summary of biographical studies of language development of children. See also the reports by Fisher, McCarthy, and Smith.

¹⁵ *Op. cit.*, p. 109.

ple sentences with phrases increase, and the proportion of compound, complex, and elaborated sentences also becomes greater. At the age of four and a half, however, less than 13 per cent of the sentences used by McCarthy's children were complex, compound, and elaborated. The tendency toward increased complexity of sentence structure continues throughout the elementary school. The writer has collected data from the written work of several hundred school children in the elementary grades, and from the conversations of eighteen children in the kindergarten and first grade. Children at the ages of ten and eleven use much longer sentences than do children at seven and eight, and they use more complex forms of expression. Complex, compound, and elaborated sentences were used by seventy-three per cent of eleven-year-olds.

4. THE GROWTH OF VOCABULARIES¹⁶

Kinds of Vocabulary. Most observers of childrens' vocabularies have been interested in the *oral* vocabulary, which is the number of words used in conversation or oral speech. Other kinds of vocabularies are the *auditory* (the words understood when others use them in oral speech), the *written* (the words used in written work), and the *reading* vocabulary (the words known when seen in printed or written materials, either in or out of context). In fact, the kinds of vocabulary seem almost to be limited only by the purposes for which language is used and the ways in which it is produced.

Methods of Studying Vocabulary. The earliest and most common method of studying children's vocabularies is to listen to their conversation or other vocalizations for a certain fixed period, sometimes an entire day, and to record every word the child says. Another method is to record his verbal responses for a brief period on one or more days. Toys, picture

¹⁶ See Bean, *op. cit.*, Dale, in *Educational Research Bulletin*, vol. 10, pp. 119-122; Dolch, *Reading and Word Meanings*; Doran, *op. cit.*; Grant, *op. cit.*; Horn, in *Twenty-Fourth Yearbook, National Society for Study of Education*, Pt. 1, pp. 185-199; Magni, *op. cit.*; Markey, *The Symbolic Process*; McCarthy, *op. cit.*, Prescott, in *Archives de Psychologie*, vol. 21, pp. 225-261; Smith, *op. cit.*

books, questioning, and other procedures are sometimes used to evoke verbal responses. Children are so active linguistically that it is difficult for one observer to record all of their vocalizations. Brandenburg found that a child three to four years old was inactive linguistically only nineteen minutes during a day's waking time. The longest single period of inactivity was four minutes.

Size of Vocabularies, Ages One to Twelve. At one year of age the average child is likely to have an oral vocabulary of two or three words. By the age of two years he has less than 300, at three years, less than 900. Then vocabulary grows very rapidly. By the age of four he knows 1500 words, at five, 2000, and at six, 2500, as shown in Table II and Figure 75. After the age of six the course of development is not so definitely known. In the textbooks used in the first three grades of the elementary school the child is likely to meet 5000 different words.¹⁷ Terman's estimates, based on the sampling of words

TABLE II. AVERAGE SIZE OF CHILDREN'S VOCABULARIES

Ages eight months to six years. (Smith)

 $N = 273$

AGE (Years, Months)	N.	I Q.	VOCABULARY		
			Number of Words	Gain	Yearly Gain
0-8	13		0		
0-10	17		1	1	
1-0	52		3	2	3
1-3	19		19	16	
1-6	14		22	3	
1-9	14		118	96	
2-0	25		272	154	269
2-6	14		446	174	
3-0	20	109	896	450	624
3-6	26	106	1,222	326	
4-0	26	109	1,540	318	644
4-6	32	109	1,870	330	
5-0	20	108	2,072	202	532
5-6	27	110	2,289	217	
6-0	9	108	2,562	273	490

¹⁷ See Gregory, in *Journal of Educational Research*, vol. 7, pp. 127-131.

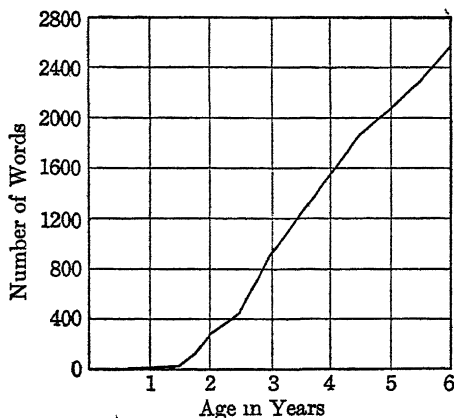


FIG. 75. GROWTH OF VOCABULARY, AGES EIGHT MONTHS TO SIX YEARS
(Smith.) $N = 273$

in the Stanford-Binet vocabulary test, indicate a vocabulary of 3600 words at the age of eight, 5400 words at ten, and 7200 words at twelve. Some estimates are higher than Terman's (e.g. Cuff's, in *Four. Educ. Psychol.*, vol. 21, pp. 212-220).

Another way of determining vocabulary growth is to record a series of consecutive responses made by children, as Smith has done, and thus to ascertain the number of different words used by children of various ages. Here, too, the very rapid growth from eighteen months to four and a half years is noteworthy. Smith's results are represented in Figure 75.

Word association tests also may give clues to growth of vocabulary. Prescott found that the average number of words given in a fifteen-minute period increased markedly with age. It was 35 at the age of seven, and 157 at thirteen. Of course, other factors than mere size of vocabulary play an important rôle in free-association tests, and we cannot conclude from this investigation that growth in vocabulary is proportional to the scores on the free-association test at these ages.

Parts of Speech in Vocabularies. A striking characteristic of vocabulary growth is the change in the proportion of nouns to the total number of words. One-half of the child's vocabulary at two years of age usually consists of nouns, and often they

make up as much as 60 per cent of the total vocabulary. This is not surprising. From early infancy the child has come in contact with many objects, all of which have names. These names probably serve the very young child as reminders of his experiences of the objects, and so he learns them quickly. Furthermore, as we have already seen, the words which we call nouns are so often in the child's mind the equivalent of a sentence, the sentence-word, and mean much more than merely the name of an object.

Because of this common habit of childhood, the words in a child's vocabulary would be classified better according to the function they serve, rather than in the way adults classify them from seeing them in a printed list. Early studies indicate that the proportion of nouns in the child's total vocabulary decreases as his vocabulary increases. They show that the proportionate number of verbs during the same period increases. By the age of five or six years, nouns form a smaller proportion and verbs a larger proportion of his total vocabulary than they did at the age of two or three.

Parts of Speech Used in Conversation. To avoid the difficulty of trying to classify words in isolation or out of the context in which they are used, analyses have been made of children's conversations. All-day conversations or conversations during certain specified short periods have been recorded. The language has been analyzed into parts of speech used in the total conversation and into number of different words used. Zylve's¹⁸ study of the conversations of third-grade pupils during a fifteen-minute story period for three months shows nouns constituting 51 per cent of the number of *different* words used, verbs 22 per cent, and pronouns but 1.5 per cent, but nouns made up only 15 per cent of the *total* number of words used, verbs 27 per cent, and pronouns 17.2 per cent.

The English language contains one definite article, *the*, and two indefinite articles, *a*, and *an*, three in all. Third-grade children used them as seven per cent of the *total* number of words in their conversation, but only one-tenth of one per cent of the number of *different* words. This means only, of course,

that certain words are used more frequently than others. Some words seem to do more of the world's conversational work than do others, as shown by various word studies which have been made to prepare spelling, reading, or other lists.¹⁹

On the basis of recent studies²⁰ we are reasonably sure of certain tendencies in growth of vocabulary with age. The proportional use of interjections and nouns decreases and the percentage of verbs, adjectives, adverbs, and pronouns increases.

5. THE DEVELOPMENT OF READING TO THE AGE OF TWELVE

The importance of reading as a language function is universally recognized. Much of the child's preparation for the learning of reading is completed before he begins to study this subject formally. By the time the child enters the first grade at school he has an oral vocabulary of approximately 2500 words.²¹ He uses sentences averaging approximately five words in length. He has a widening experiential background, which will enable him to comprehend the material that he is to read. The average six-year-old already knows some of the letters of the alphabet and can give their names upon seeing their visual forms. He may be able to recognize the printed forms of a few words. Sometimes parents, thinking to help the pre-school child learn to read, teach him the letters and have him spell out some words. Such help has little value. Trying to teach the child to read by spelling out words is a waste of time and is likely to delay the child's progress in learning to read effectively because good readers do not spell out words in order to read them.

¹⁹ See, for example, Thorndike's *The Teacher's Word Book*, or the *Teacher's Manual to the Horn-Ashbaugh Speller*.

²⁰ See Day, *op. cit.*; McCarthy, *op. cit.*; Smith, *op. cit.* For an interesting interpretation of changes in the child's vocabulary with age, see Nice, in *Child Development*, vol. 3, pp. 240-246

²¹ Horn, in Part I of the *Twenty-Fourth Yearbook*, pp. 185-199, gives a list of the 2500 words in the vocabularies of children up to and including first grade. Horn, in *Childhood Education*, vol. 3, pp. 118-122, lists the 1003 words most commonly used by children from one to six years of age.

Complexity of the Reading Process. The reading process is very complex, consisting of a series of more or less habitual responses, including thoughts, feelings, and attitudes, which are made to stimulations from the printed or written page. It involves several complex motor habits and associative or other mental processes as may be seen by analyzing it into its constituent processes.²² In the child's oral reading, at least six important processes are involved from the time he looks at the printed material until he speaks the words. Visual impressions are received upon the retina, nerve impulses pass from the retina to certain areas of the brain, and associations are aroused or established, giving meaning to these nerve impulses. Then, impulses must pass from the visual centers to the motor speech centers of the brain, impulses pass from the motor speech centers to the muscles of the lips, tongue, vocal cords, and certain other muscles of the cheek and throat, and the organs of speech are moved and the child speaks the words. If, however, the child is learning to read, and the teacher pronounces the words to him, their sounds must also be connected with the impressions of their visual forms so that the latter may become effective cues. In this case, the first two steps or processes are closely associated with three others. Auditory impressions are received in the ear, impulses pass from the ear to the auditory centers of the brain, and impulses pass between auditory and visual centers, or some corresponding process takes place establishing associations between the form and the sound of the word. When the child reads silently the last three steps or processes may be slurred over unless inner speech is present, but the first three steps are always present. We know very little about the physiological nature of some of these processes.

Motor Habits in Reading. The child has to form a number of

²² For a fuller account of the reading process see any of the following volumes on the psychology of reading: Brooks, *The Applied Psychology of Reading*, chaps. 3-7; Buswell, *Fundamental Reading Habits, A Study of Their Development*; Gates, *The Improvement of Reading*; Gray, *Remedial Cases in Reading, Their Diagnosis and Treatment*; Judd, *Reading, Its Nature and Development*; O'Brien, *Silent Reading*; Schmidt, *Experimental Study in Psychology of Reading*; Thorndike in *Journal of Educational Psychology*, vol. 8, pp. 323-332; Wyman and Wendle, in *Journal of Educational Psychology*, vol. 12, pp. 518-531.

motor habits in learning to read. Particularly important among these are the eye movement habits, which have been studied extensively, especially at the University of Chicago under the direction of Charles H. Judd. While reading, he must adjust his eyes constantly so that the line of clear vision moves forward along the line of print with several stops. Then the eyes move back to the beginning of the next line, usually by a single quick movement known as the return sweep. The pauses in the forward movement, known as *fixations*, usually are not known to the person as he makes them. If the child has not learned to read very well, he is likely to make too many fixations, his return sweep may be unskillful, and other ineffective eye movements may be present. The result is that his reading is slow, and he does not grasp the meaning of what he is trying to read. The eye pauses or fixations are short, averaging from two-tenths to four- or five-tenths of a second. These pauses are very important because the child sees the printed material only during the fixations.

The good reader does not look at each letter and then combine them to form the words, but he perceives whole words or short phrases as units. The amount the child can perceive during one fixation or eye pause is known as the *visual perceptual span*. It is of great importance in reading. As the child grows older and learns to read effectively the span of visual perception increases.

Understanding Sentences and Paragraphs. In addition to the processes we have just discussed, the child must do certain other things if he is to understand the speech of others or comprehend printed material. He must select the appropriate meaning for each word in the sentence and paragraph in which it occurs, and also give each word the proper emphasis in relation to the rest of the sentence. As William James has put it, "The same object is known everywhere, now from the point of view, if we may so call it, of this word, now from the point of view of that. And in our feeling of each word there chimes an echo or foretaste of every other."²³

²³ *Principles of Psychology*, vol. 1, p. 281.

Many words have more than one meaning, but in a particular sentence only one of these is suitable. If the child grasps the meaning of the sentence as a whole he has to select just this meaning for a word, and no other. Anyone can verify this by the following simple expedient. Select a sentence from ordinary reading material and look up in a dictionary the meanings of a few of the words of this sentence. Pick at random from the dictionary a definition of each word and substitute it in the sentence. Thus, in the following sentence from an experimental study of language development, we have selected certain words and given some of their common definitions which should be substituted for them in the sentence: "The *mean* number of *words secured* from the girls is greatly in *excess* of the *mean* number of *words used* by the boys."

WORD	DEFINITIONS
mean	base, stingy, inferior, shabby, despicable, common, low, humble.
words	dispute, talk, discourse, speech.
secured	guarded, made safe, insured, made fast.
excess	intemperance, remainder.
used	made a practice of, treated, inured, acted toward.

Or take this sentence from a third-grade reader: "The *little* bird who can *fly so fast* and so *far weighs* only as much as one copper cent."

WORD	DEFINITIONS
little	short in duration, weak, narrow, mean.
fly	float, wave or soar in the air, shift or veer suddenly, to be spent rapidly, to flee.
so	therefore, by this means, well, more or less.
fast	fixedly, closely, securely, soundly, firmly.
far	remotely, greatly, very much.
weighs	to press hard, judge, consider, to be considered as important, poise, lift up (as an anchor)

The third-grade child who reads this sentence has indeed a complex task to reject meanings such as have just been given and to select the ones that do fit in it. So the child who is learning language, whether in reading or listening to others, really forms habits of responding correctly to many words in different contexts. He forms them so well that he really is not aware of selecting word meanings, except possibly at certain stages in

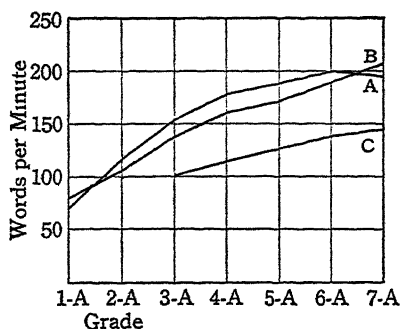


FIG. 76. RATE OF ORAL READING IN GRADES 1-A TO 7-A, ON EASY, MEDIUM, AND DIFFICULT PARAGRAPHS OF THE GRAY ORAL READING TEST

learning a foreign language or in dealing with language situations that are very difficult for him.

We see many illustrations of the child's giving words the wrong emphasis, as when he reports at home that the teacher said, "Everybody in the class failed on this test and must make it up," whereas the teacher really had said, "Everybody in the class who failed on this test must make it up." Both in listening to others and in reading we find wrong impressions caused by wrong potency of words.

Improvement in Oral Reading. The child's ability in oral reading may be measured by the number of words he reads per minute and by the number of errors he makes in reading certain standard passages. Rate increases markedly in the earlier grades of the elementary school, and then more slowly as the sixth or seventh grade is reached. (See Fig. 76.) The number of errors decreases sharply during the first three or four grades, and more slowly thereafter. (See Fig. 77.) A child who has been in the first grade a half year usually can read orally approximately 75 words per minute, of easy material. By the middle of the third grade he can read almost twice as fast, and by the sixth or seventh grade his speed reaches approximately 200 words per minute. His improvement in accuracy (that is, the decrease in number of errors) shows a progress parallel to that in rate.

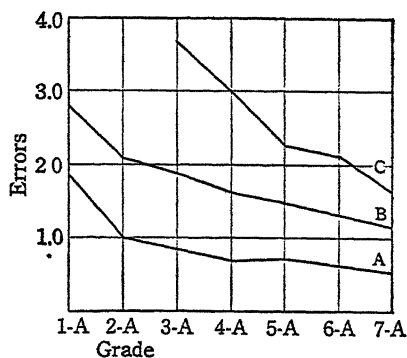


FIG. 77. ERRORS PER PUPIL IN GRADES 1-A TO 7-A ON EASY, MEDIUM, AND DIFFICULT PARAGRAPHS OF THE GRAY ORAL READING TEST

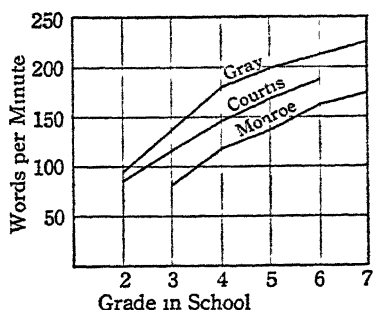


FIG. 78. IMPROVEMENT IN RATE OF SILENT READING, GRADES II TO VII, AS SHOWN BY THE NORMS OF THREE READING TESTS

Improvement in Silent Reading. The child improves more rapidly in the rate and comprehension of silent reading in the earlier grades and a little more slowly in the sixth and seventh grades, as is shown in Figures 78 and 79. The rate of silent reading improves from less than one hundred words per minute at the beginning of the second grade to more than two hundred in the sixth grade. With good instruction normal children at the age of twelve can read easy material at a rate of 250 to 290 words per minute.

Reading Vocabularies, Grades One to Six. Sufficient definite information is lacking on the size of children's reading vo-

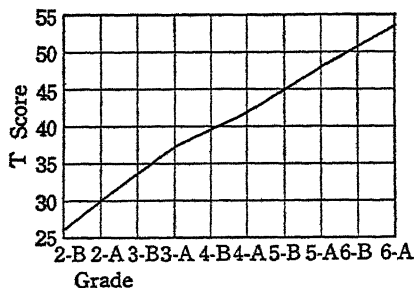


FIG. 79. IMPROVEMENT IN READING SHOWN BY GRADE NORMS ON THORNDIKE-McCALL SILENT READING TEST

cabularies and on the improvement therein from grade to grade. The average child in the second grade has been found to recognize in context 1300 or more of the 1500 words in second readers, and about 1000 words out of their context.²⁴ In the textbooks of the first three grades 5000 different words are likely to be met,²⁵ whereas in a single set of readers for the elementary grades from 5000 to 6000 different words may be found.²⁶ In the primer and first reader of a set of readers, less than four hundred meanings were found, in the second reader, approximately six hundred additional meanings occurred, and in each of the next three readers, approximately fifteen hundred additional meanings. These facts are shown in Figure 80. The vocabulary or "meaning" gradient is not as steep during the first two years of the elementary school as during the later years. An easy gradient is desirable during the initial stages

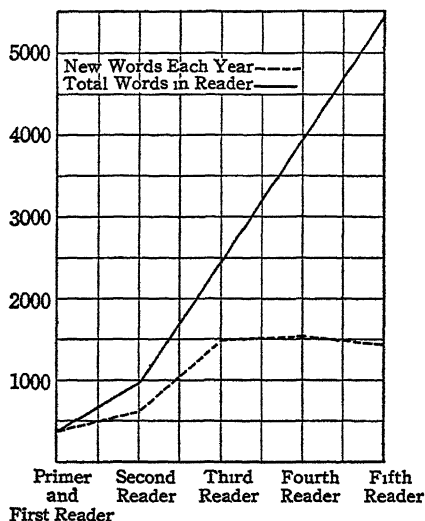


FIG. 80. NEW WORDS AND TOTAL NUMBER OF WORDS IN A SERIES OF READERS

(Dolch.)

²⁴ Sholty, in *Elementary School Teacher*, vol. 12, pp. 272-277

²⁵ Gregory, in *Journal of Educational Research*, vol. 7, pp. 127-131.

²⁶ Dolch, *Reading and Word Meanings*, chap. 2.

of learning to read. The child often knows nearly all of the words of grades one and two through oral speech; but he must learn to recognize their visual forms, to use them as cues to meanings, and to perform the other processes involved in reading. The readers of the last three years of the elementary school bring to the child many words found in the literary language of books rather than in ordinary everyday speech.

6. SPEECH DEFECTS

In many children, the development of language does not proceed in the orderly course so far described but is subject to various disturbances. Speech defects have been studied extensively, and so much pertinent material exists that an adequate treatment of it is far beyond the scope of a volume on general child psychology. The discussion here must be limited to a brief summary of one of the most significant problems, that of stuttering and stammering.

*Stuttering and Stammering.*²⁷ Although the terms are often confused, stuttering is properly used to designate a repetition of sounds, words or phrases, and stammering to indicate a persistent blocking or inhibition of speech. Surveys indicate that approximately 1 per cent of school children stutter, there being a larger number of stutterers than there are of blind and deaf children combined. Some clinical evidence of doubtful conclusiveness indicates that much more than 1 per cent of children stutter at some time in their lives, from 15 to 20 per cent being so reported. From these data it should not necessarily be concluded, however, that children will inevitably outgrow the tendency to stutter, as is popularly believed. Wallin found that the proportion of school children who stutter increases from the first to the eighth grade. If children outgrow

²⁷ Fletcher, *The Problem of Stuttering*; Head, *Aphasia and Kindred Disorders of Speech*; Robbins and Sunchfield, *A Dictionary of Terms Dealing with Disorders of Speech*; Scheidemann, *Psychology of Exceptional Children*, chaps. 3-5, Travis, chap. 16, "Speech Pathology" in *Handbook of Child Psychology* (contains a good discussion and bibliography of 75 titles); Travis, *Speech Pathology*, Wallin, in *School and Society*, vol. 3, pp. 213-216; Wallin, *Speech Defective Children in a Large School System*.

the habit, therefore, they must do so principally before entering school.

The greatest frequency of stuttering is reported between the ages of two and four years. In 85 per cent of cases, the onset of stuttering is before the age of eight. Stutterers, in undue proportion, are retarded in school, probably because of their handicap in answering oral questions. The average amount of retardation is about one year. All surveys agree in indicating that stuttering is much more common among boys than among girls.

The causes of stuttering are not thoroughly understood, and little agreement exists among the leading writers in this field. The two principal conflicting theories held at the present time are that speech disorders of this type are due to *neurological disturbances*, and that they are due to unfortunate conditions with respect to *mental hygiene*.²⁸

The mental hygiene theories of stuttering hold that it is a form of social maladjustment. Because of experiences that have called forth fear, timidity, feelings of inferiority, or expectations of censure, a child may develop a general inhibition of speech. It is probable that a single experience of this kind seldom causes stuttering; but a long series, even of relatively mild fear conditionings in relation to speech, may do so. Such episodes are particularly destructive if they occur just as the more complex habits of speech are becoming organized, at the ages of three or four. The cure or prevention of stuttering, according to the mental hygiene point of view, necessitates relieving the child of emotional tensions and attitudes of fear. In some cases this alone will cause the speech defect to disappear. In other instances an improvement of mental hygiene conditions must be accompanied by specific habit retraining.

The *neurological* explanations of stuttering have been based chiefly on the theory of cortical dominance. From various sources it has long been known that the principal speech centers

²⁸ Fletcher, *op. cit.*, supports the mental hygiene theory; Travis, *op. cit.*, the neurological.

of the brain lie on the dominant side, which is the left for right-handed persons, and the right in the case of the left-handed. Some evidence indicates that stuttering may come from the conflict of neural impulses resulting from an incomplete dominance of one side or the other. Hereditary structural defects, birth injuries, and severe febrile diseases are also held to account for some cases of stuttering.

Handedness and Stuttering. A deduction from the cortical-dominance theory of stuttering is that a change of handedness, as in compelling a left-handed child to use the right hand, may cause stuttering. The evidence as to whether this is actually true is not clear. Statistical studies which indicate that, in some groups, 90 to 95 per cent of children so changed are not affected, give little support to this theory. On the opposite side, certain laboratory and clinical studies show a much larger percentage of speech disorders associated with a change of handedness.

In one case, a left-handed, timid, country boy moved to a large city. He was in the fourth grade and was already writing with his left hand, but the teacher insisted on his using the right one. Because he was so helpless with it and could write nothing legible, he still used the left hand a great deal. The teacher, much to the country boy's discomfiture, scolded him before the entire class of forty or more pupils. She added materially to his embarrassment by striking the back of his left hand with edge of a large ruler whenever she saw him using this hand in writing or drawing. Other disturbing factors were his inability to draw or to read music, for he had had no previous instruction and very little ability in these subjects. He did not stutter, in spite of such stupid treatment at school. He has continued to write with the right hand, although he is still predominantly left-handed, having very little motor skill with or control of the right hand. He has not become a stutterer.

In another case, a left-handed girl living in a town of fifteen hundred entered first grade at the age of six. She had no noticeable speech difficulty. Her teacher required her to use

the right hand in learning to write and draw. Within a few weeks a very bad case of stuttering and stammering developed. At the request of her father, who was the superintendent of schools, she was allowed to use her left hand in writing and drawing. The speech disorder cleared up almost as quickly as it had appeared.

Although the statistical probability of inducing stuttering by changing the handedness of a child in writing and drawing may be small, yet one may well question the advisability of doing so unless proper precautions are taken and a careful study made of each case in which the child is strongly left-handed.

7. FACTORS INFLUENCING LINGUISTIC DEVELOPMENT

Many studies of children's language have been concerned with the relationship between linguistic development and other factors such as age, sex, intelligence, and socio-economic environment. A few of the most pertinent findings may be summarized here.

*Chronological Age.*²⁹ It is very evident that a child has a progressively greater command of language as he grows older. Indeed, age is usually taken as the fundamental norm of development, as most of developmental graphs of this chapter indicate. (See Figs. 71, 72, and 75.) It must be recognized, however, that mere age is not a primary factor. The maturation of the structures necessary for speech, and the increases of motor skill and of intelligence, all follow age in average development. With age, too, come the experiences and situations for learning from which meanings develop and by which language is extended.

Physiological Condition and Motor Ability. The child in good bodily health, whose physiological condition makes him active and vigorous, is likely to have more energy and more experiences and to be more alert to things going on about him

²⁹ See McCarthy, *op. cit.*, pp. 51, 94-98, 113-114, 121, etc.; Smith, *op. cit.*, pp. 17, 57 ff.

than is the child in poor physical condition. Such differences are likely to lead to greater language development. Even sickness among very young children may bring out marked differences in personality in a short time.³⁰ Variations in physiological condition over short periods of time probably cause greater differences in early childhood than during later periods. Growth and development are more rapid at the younger ages, and a slight deviation results in a greater difference.

The child's development of a motor skill during early infancy may temporarily diminish vocal play while the motor function is being established. For example, Shirley³¹ found that babies seemed to vocalize less during the time a new motor act was being established. The response of reaching for objects developed from the fourteenth to the twenty-third weeks, and during this time the infants vocalized less than between the fifth and thirteenth weeks. Again, vocalization increased from the twenty-fifth to the thirtieth weeks, but decreased sharply at the thirty-first week, the median age for sitting alone, and remained low at the thirty-third and thirty-fourth weeks, the median age for creeping. After walking was established, the amount of vocalization increased very rapidly and far beyond the amount of the pre-walking period. On the other hand, others³² have found that the degree of certain motor skills is somewhat proportional to the total amount of vocalization, and to the number of consonant blends.³³ The more talkative nursery school children tend to be slightly more active physically, and their talking about things and their use of things are positively related.

*Sex Differences.*³⁴ The language development of girls is

³⁰ See Gesell and Thompson, in *Genetic Psychology Monographs*, vol. 6, pp. 1-124.

³¹ *Op. cit.*, pp. 69-71.

³² See Wellman, Case, Mengert, and Bradbury, *op. cit.*; also Goodenough, in *Child Development*, vol. 1, pp. 29-47; and Fisher, *op. cit.*

³³ Correlations of .65 and .67.

³⁴ See Blachly in *Proceedings of the Oklahoma Academy of Sciences*, vol. 3, pp. 151-155; Day, *op. cit.*; Doran, *op. cit.*; Fisher, *op. cit.*; McCarthy, *op. cit.*; Mead, in *Pedagogical Seminary*, vol. 20, pp. 460-484; Nice, in *American Speech*, vol. 2, pp. 1-7; Smith, *op. cit.*; Terman, *Genetic Studies of Genius*, vol. 1; Wellman, Case, Mengert, and Bradbury, *op. cit.*

more rapid than that of boys, in extent of vocabulary, in the age at which short sentences are used, and in comprehensibility of their speech at early ages. Some of these differences, such as size of vocabulary and the extent to which vocalizations are comprehensible, seem to decrease as the child grows older, so that by the age of five or six years they are small indeed. Figures 71 and 72 show some of the sex differences in language functions at the earlier ages.

During school years, the average girl exceeds the average boy in a number of linguistic functions. Girls are, as a group, superior in rote memory, in word-building, and in sentence-completion tests. They have been found to write longer compositions and to use longer sentences in them. Girls receive higher average school marks in English. On the other hand, boys excel in abilities involving number manipulation and in arithmetical reasoning.

It is impossible to determine to what extent these differences are inherently connected with sex, or to what extent they are due to differences in the social stimulation received by boys and girls.

*Intelligence and Language.*³⁵ Many observers have noted a definite relationship between the age at which a child begins to talk and his intelligence as measured later by tests. Feeble-minded children begin to talk much later than do normal children. Children of superior intelligence talk earlier than do those of average mental ability. We should not conclude, however, that the child who is late in talking is necessarily feeble-minded or dull mentally, although many a mother has been seriously worried about her child's lateness in showing this sign of development. The author has observed several of such children and has given them the Stanford-Binet tests later, when they were in first grade, and has found them to be of normal intelligence. In all such problems as this one, we must be cautious in applying to individuals for predictive purposes facts which, "on the average," are true. The differences in

³⁵ Day, *op. cit.*; McCarthy, *op. cit.*, pp. 59, 92, and 121; Mead, *op. cit.*; Terman, *op. cit.*; Town, in *Psychological Clinic*, vol. 6, pp. 229-235.

average ages at which children of superior, average, and sub-normal intelligence learn to talk must be interpreted and applied in the light of the overlapping between the groups. Stating the same matter less technically, we may say that while feeble-minded children learn to talk at an older age than children of normal and superior intelligence, yet some children of normal or above normal intelligence are late in learning to talk.

Intelligence is generally regarded as an important factor in the more complex development of language. The child having good mental ability has a distinct advantage, other things being equal, over the stupid child. His powers of critical observation, of seeing relations, of grasping meanings and of accurately discriminating differences in meanings, enable him to develop his language habits more rapidly and more effectively than the child who has less intellectual ability. The very meaning of intelligence implies that the child having much of it can profit more from his experiences than he who has less of it. He has more of the stuff from which language develops.

On the other hand, the question may well be raised whether the child's superior linguistic development is caused by his superior intelligence, or whether the latter is the result of his superior linguistic development. At the present time, the conclusion is not certain. Some studies have been made,³⁶ and many opinions have been expressed. Correlations between intelligence test scores and scores on language tests usually are not conclusive because the verbal elements bulk so largely in the intelligence tests. It has been found, however, that some children tend to maintain the same ranks on language tests and on the verbal and non-verbal elements of intelligence tests. Also, certain groups selected as alike in age, sex, social-economic status of parents, and total mental test score, tend to make the same percentage of total score on verbal and non-verbal elements of mental tests. These data favor the conclusion that differences in intelligence test scores are not caused principally

³⁶ See, for example, Day, *op. cit.*; Pyles, in *Child Development*, vol. 3, pp. 108-113; Shirley, *op. cit.*

by differences in language development.³⁷ We are inclined to believe that language development and mental development go together, each stimulating or furthering the other. By means of language the individual comes to understand a wider range of things, both of the present and of the past, than he could if he were dependent upon direct first-hand experience alone. Thus mental development is affected by language. Similarly, the keen intellect sees meanings and differentiates objects, events, and experiences more clearly. By finding and attaching symbols to these bits of meaning and by seeing their interrelationships, the development of language is stimulated.

*Environment.*³⁸ The child's environment has an important effect upon his language development. The social-economic status of the family is closely related to his linguistic ability. Children who come from homes of more comfort and refinement and whose parents are better educated, have larger vocabularies and better language habits than children of the poorer and less educated groups. Apparently, these differences are found even when the two groups of children have the same intelligence. This is not surprising, since language habits are learned, and better homes provide better examples and more stimulating situations.

The evidence concerning the effect of foreign language homes is not conclusive. Some studies have found children from bilingual homes to have certain handicaps, but other researches have even discovered points of superiority in the foreign-language groups. At present, the evidence is insufficient to justify the often-made assumption that children from immigrant families are handicapped in every aspect of language.

The effect of the age of a child's associates on his language development has been investigated. It is apparent that a large amount of association with adults accelerates the lan-

³⁷ See Day, *op. cit.*, for an account of an interesting experiment throwing light on this problem.

³⁸ Chamberlain, *The Child*; Day, *op. cit.*; Gesell and Lord, in *Journal of Genetic Psychology*, vol. 35, pp 339-356; Markey, *op. cit.*; McCarthy, *op. cit.*; Smith, *op. cit.*; Van Alstyne, *op. cit.*

guage development of a child. In comparing children who associate with other youngsters who are older or younger, the results are not so certain, even though the older associates' better command of language should be expected to be an aid.

In general, the child's language development must be regarded as a result of the interacting and inseparable influences of maturation and learning. Excellences or handicaps in language functions may be due to variations in basic structures in one case, and to differences in environmental experiences in another. The linguistic skills illustrate the general principles of development emphasized in the preceding chapters. They represent a continuous process of development from that which is simple and homogeneous to that which is complex, modified, and differentiated.

organismic hypothesis

SELECTED REFERENCES

Blanton and Blanton, in *Child Guidance*, chap. 8, give a detailed discussion of the more important problems and difficulties involved in the child's learning to talk; Gesell, in *The Mental Growth of the Pre-School Child*, chap. 9, pp. 213-221, and parts of chaps. 21-25, also presents important data on linguistic development; McCarthy, in *The Language Development of the Pre-school Child*, chaps. 3-7, reports an extended research on language development and analyzes responses as to length, functions, sentence construction, parts of speech, and in chap. 8 of *Handbook of Child Psychology* (revised edition, edited by Murchison), gives a comprehensive account of language development, including a bibliography of 236 titles (to 1932); Piaget, in *Language and Thought of the Child*, chaps. 2-4, carries forward the treatment of language development during the ages from four to eleven years; Shirley, in *The First Two Years*, vol. 2, *Intellectual Development*, chap. 4, discusses beginnings of speech; Smith, in *An Investigation of the Development of the Sentence and the Extent of Vocabulary in Young Children*, reports an extensive investigation of the vocabulary and kinds and lengths of sentences used by children up to the age of six years; Stoddard and Wellman, in *Child Psychology*, chap. 7, report the facts of linguistic development as determined by experimental studies to 1934; Wagoner, in *Development of Learning in Young Children*, chap. 12, discusses the child's learning to talk.

For an introduction to the problems of speech pathology, see Scheidemann, *The Psychology of Exceptional Children*, chaps. 3 and 4; Fletcher, *The Problem of Stuttering*; and Travis, *Speech Pathology*. See also the latter's chap. 19,

"Diagnosis in Speech," in *Thirty-Fourth Yearbook* of the National Society for the Study of Education.

Problems relating to reading are discussed in many volumes such as Monroe, *Children Who Cannot Read*, Scheidemann, *op. cit.*, chap. 14, and the *Twenty-Fourth Yearbook*, Part I, and the *Thirty-Fourth Yearbook*, chap. 12, of the National Society for the Study of Education (chap. 13 by Smith discusses diagnosis of difficulties in English); see also recent standard textbooks on psychology of reading and methods of teaching reading.

Additional references are given at the end of this volume. See also review of recent literature on language development by Meek and Jersild, in *Review of Educational Research*, vol. 6 (February, 1936), pp. 28-30.

CHAPTER VIII

THE DEVELOPMENT OF MENTAL FUNCTIONS

I. PROBLEMS OF MENTAL GROWTH

THE development of the intellectual functions during childhood has always been a matter of major interest in child psychology. It is probable that more research has been performed on this topic than on any other single problem in the field. The description of the course of mental development from birth to the age of twelve may conveniently be divided into two principal sections. The present chapter traces the growth of the more important particular mental functions, including perception, attention, memory, and reasoning. In the next chapter, the problem of general mental ability or intelligence receives consideration.

The study of the particular mental functions in childhood offers a large number of problems of both theoretical and practical significance. When does the child first show signs of mental development? When may the first indications of memory be observed? What is the course of development of the ability to remember? How well can the young child give attention to persons, objects, and events in his environment, and how does this ability develop? Does the child reason before puberty, or is the older view correct that this function develops only in adolescence? If the child reasons at an earlier age, in what significant ways does his reasoning differ from that of adolescents and adults? Are there any characteristic developmental trends observable in his various mental traits? How consistent is the child in the development of mental abilities? What relationships exist between earlier and later progress in these characteristics? These are some of the questions to which answers are now attempted. On a number of points, as will

appear presently, adequate information is lacking, and much further research is needed.

Curves of Growth and Rates of Growth. The problem of the representation of growth has already been encountered in connection with the studies of bodily size.¹ The topics relating to mental development present even more severe difficulties in the quantitative and graphic description of growth. These problems become more involved as growth is studied more carefully and intensively. A brief and non-mathematical description of the drawing of growth curves may help the reader to be more critical and more effective in his study of the mental development of the child. In describing the development of specific mental functions and in considering developmental changes in intelligence, two things must be differentiated clearly: (1) the amount or efficiency of a function at the various times or ages under consideration, and (2) the rate at which the function grows. The child's capacity to do some particular thing may increase each year, so that he has more of it at any age than he has had previously. It is important not only to

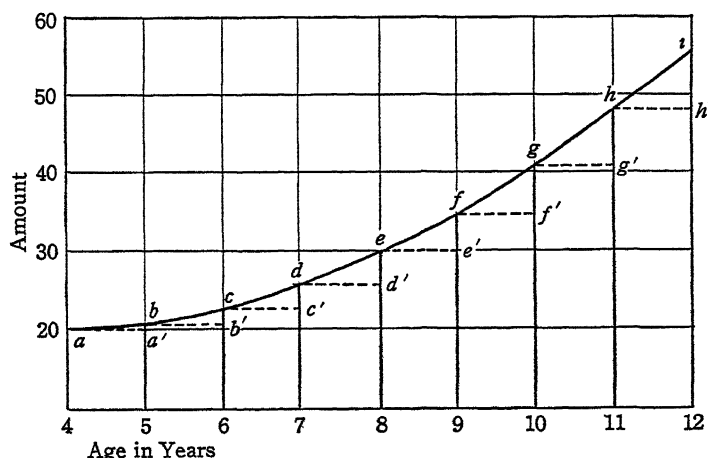


FIG. 81. THEORETICAL GROWTH CURVE, POSITIVE ACCELERATION

Growth each year is 1 point more than that of the preceding year. See columns 2 and 3, Table 12.

¹ See pages 105-106, 132-134.

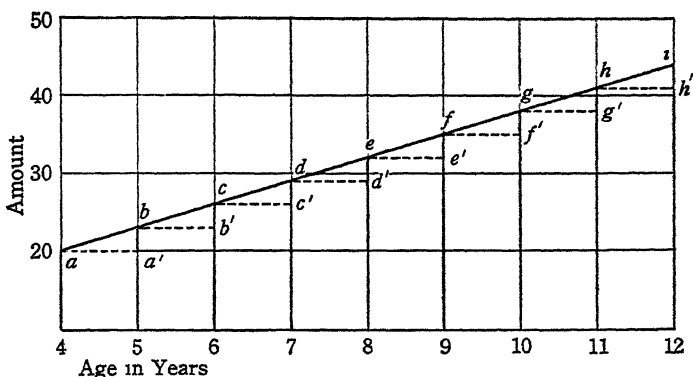


FIG 82. THEORETICAL GROWTH CURVE, ZERO ACCELERATION

Growth each year is the same as that of the preceding year. See columns 4 and 5 of Table 12.

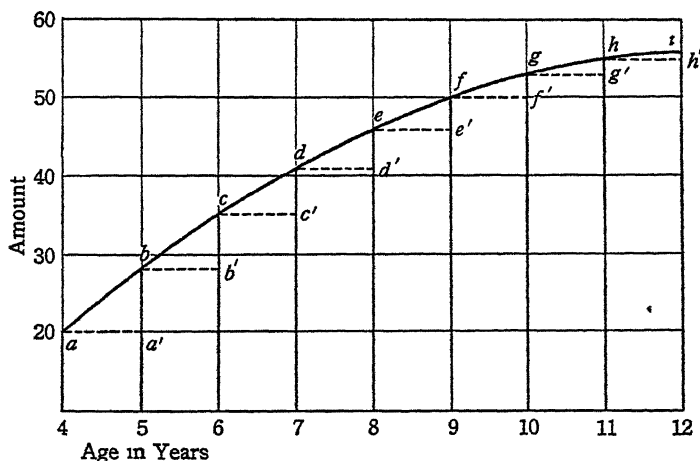


FIG 83. THEORETICAL GROWTH CURVE, NEGATIVE ACCELERATION

Growth each year is 1 point less than that of the preceding year. See columns 6 and 7, Table 12.

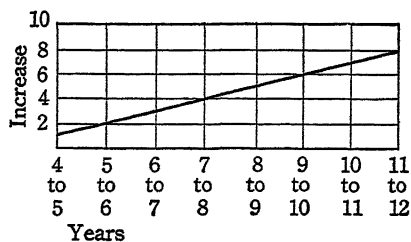


FIG. 84. INCREASE IN RATE OF GROWTH

Shown by column 3 of Table 12 and the theoretical curve of Fig. 81.

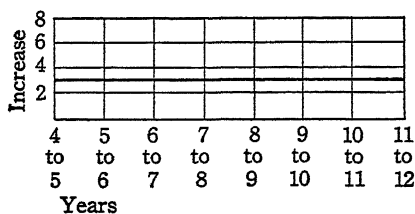


FIG. 85. CONSTANT RATE OF GROWTH

Shown by column 5 of Table 12 and the theoretical curve of Fig. 82.

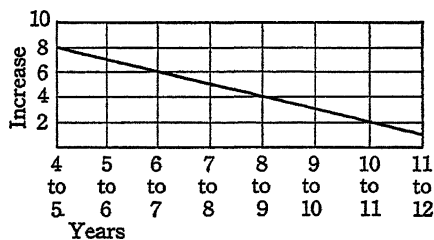


FIG. 86. DECREASE IN RATE OF GROWTH

Shown by column 7 of Table 12 and the theoretical curve of Fig. 83.

know this fact, but also to ascertain the rate at which it has been increasing, or what is its law of growth. Obviously the amount of a capacity may increase, while the rate at which it increases may either (1) increase, (2) remain constant (or unchanged), or (3) decrease. The simplest cases of this variation are shown in Figures 81, 82, and 83, in which the rate of growth from one age to another is shown to increase, to remain the same, or to decrease, respectively. The corresponding curves for rate of growth are shown in Figures 84, 85, and 86. In each of Figures 81 and 83 the rate of growth itself changes at a constant rate so that the corresponding rate curve is a straight line. It rises from the earlier to the later ages, as in Figure 84, or declines from the earlier to the later ages, as in Figure 86.

Rates of growth may be found quite readily by subtracting the score of each age from the score at the succeeding age, as shown in Table 12, or they may be determined graphically as is illustrated in Figures 81, 82, and 83. The lines 4a, 5b, 6c, etc., are drawn, and then the dotted lines aa', bb', cc', etc. Then a'b, b'c, c'd, etc., are the amounts by which growth increases from year to year, and are plotted to form the rate curves shown in Figures 84, 85, and 86. The curve in Figure 81 represents growth which is more rapid at the later ages, and is said to be *positively accelerated*. The curve in Figure 82 rises at the same rate throughout, and is a case of *zero acceleration*. The rate curve for this case, Figure 85, is a horizontal straight line, that is, it is parallel to the base line. Figure 83 is the case

TABLE 12. THEORETICAL SCORES AND AMOUNTS OF IMPROVEMENT

1 AGE	2 SCORE	3 GAIN	4 SCORE	5 GAIN	6 SCORE	7 GAIN	8 SCORE	9 GAIN
4	20		20		20		20 0	
5	21	1	23	3	28	8	21 0	1 0
6	23	2	26	3	35	7	22.5	1.5
7	26	3	29	3	41	6	24.8	2.3
8	30	4	32	3	46	5	28.2	3.4
9	35	5	35	3	50	4	33.3	5.1
10	41	6	38	3	53	3	40.9	7.6
11	48	7	41	3	55	2	52.3	11.4
12	56	8	44	3	56	1	69.4	17.1

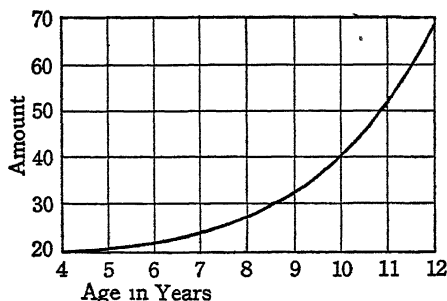


FIG. 87. THEORETICAL CURVE OF GROWTH, POSITIVE ACCELERATION, THE RATE BECOMING INCREASINGLY GREATER

The amount of growth each year is 1.5 that of the preceding year. See columns 8 and 9 of Table 12.

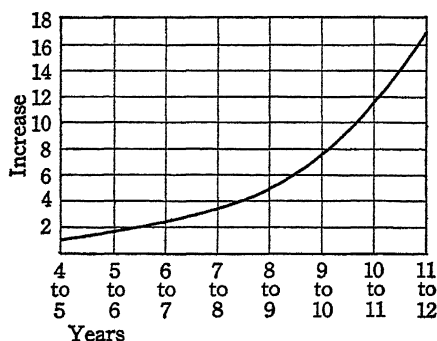


FIG. 88. INCREASINGLY RAPID RATE OF GROWTH

Shown by column 9 of Table 12 and the theoretical curve of Fig. 87.

of *negative acceleration*. The curve rises, but not so rapidly at the later ages as in the earlier. The rate curve (Figure 86) is a straight line inclined toward the base line as age increases.

Figures 81 to 86 are about as simple theoretical growth and rate curves as can be drawn. In more complex instances the rate of growth may change in such a manner that the rate curve may have any one of many kinds of shapes, and the growth curve will then be different also. In Figure 87 is drawn a growth curve in which the rate (Fig. 88) increases by a con-

stantly increasing amount, that is, the rate curve itself is an upward curving line.

In the present chapter and the next one following many opportunities arise for the student to apply these concepts concerning growth curves. Various investigations are not always in agreement on the shapes of the curves of the several kinds of growth. Perhaps the most notable disagreement exists in the matter of the growth curves for general intelligence. Much work must still be done to gain conclusive information on many problems.

Mental Growth During the First Year. The relatively simple sensory and motor capacities observed during infancy are usually interpreted as the beginnings of mental growth. Some may well question whether such early motor responses as turning the head to the left or right, or lifting the chest from the table when lying prone, have any significance for mental development. Less question is raised about the establishment of eye coordination, or the ability to follow a moving object with the eyes, because these seem to have some relation to the infant's attention. They are responses to stimuli which signify the beginning of some sort of awareness. When the child has developed to a point at which he reaches and grasps an object, or turns his head to follow an object, or rings a bell purposefully, or shows unmistakable signs of remembering persons, we are inclined to believe that his mental life has begun. Early observations of babies from birth until the twelfth month show that they make remarkable progress during this time, and perhaps greater than in any subsequent year.

2. SENSORY AND PERCEPTUAL CAPACITIES

Difficulties in Measuring Discrimination. The methods used for measuring the finer sensory and perceptual discriminations of adults in the psychological laboratory are often poorly adapted for use with children. A certain degree of comprehension of the nature of the task is necessary, which is hard to impart to a child. Experiments of this type often consume

much time, resulting in fatigue, boredom, and poor motivation. It is difficult, therefore, to know, in the case of younger children, whether sensory capacities are being measured, or whether the chief variables are the intelligence and motivation of the child.

From ordinary observational evidence, there is no doubt that children make many fine discriminations. Children during the first two years of life are able to perceive many differences, as shown by their comprehension of language before the twelfth month. They show skillful discriminations of sound and perceptions of visual forms in their ability at two years to point to pictures of objects when asked to "show me the shoe," "show me the dog," or "show me the house." They can identify differences in position at two and three years, as in knowing "on," "in," "behind," "in front of," and "under." Such abilities as these, together with those underlying a wide range of motor, linguistic, social, and other adaptive activities, indicate an increasingly effective perception of differences. The reasoning abilities of children at two, three, or four years presuppose considerable discrimination of likenesses and differences. A girl of four (Stanford-Binet I.Q. 122) playing at one end of her mother's sewing room heard a very slight noise. She saw a pin lying on the floor at the edge of the grass rug. It apparently had not been there before. She picked it up and held it as high as the shelf of the sewing machine and let it drop on the floor. "No, it didn't sound like that," she said aloud, talking to herself. Again she dropped it from the same height upon the rug. "No, it didn't sound like that; it must have hit part on the rug and part on the floor."

A few more exact laboratory descriptions of sensory and perceptual discriminations have been made and are worthy of a brief review. In most instances, however, these studies suffer from the further handicap that they are not retest or seriatim measurements, but tests of different children at various ages. Researches are available which throw some light on children's abilities to discriminate pain, colors, sounds, weights, and time intervals.

*Sensitivity to Pain.*² Pain is one of the crudest and most fundamental of receptor-aroused processes. Sensitivity to pain is determined for various specified areas by applying a pointed object, such as a needle, to them with varying amounts of pressure. As we already have noted (see page 96), infants probably are sensitive to pain stimulations at birth or a few hours thereafter. Among pre-school and older children the method used is to have the child report when the pressure of the sharp point on a given spot becomes painful. This makes the measurement highly subjective. Accordingly, we cannot be sure, even under the best laboratory conditions, that the results are reliable. Many older children have become inured to pain or are unwilling to acknowledge that the pressure is painful. They have taken on something of a stoic attitude toward bearing and acknowledging pain. If we take the results at their face value, they indicate that sensitivity to pain decreases as children become older (see Fig. 89), and that girls are more sensitive to pain during the school ages than are boys. Probably the thickening of the skin as the child grows older has much to do with his decreased sensitivity to pain.

Perception of Colors. The ability to discriminate the simpler colors matures rapidly from the age of one and a half years to that of four, at which stage the mature level is almost reached. Cook³ tested 110 young children in the naming and matching

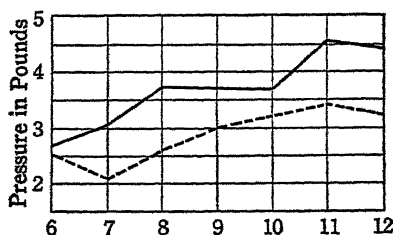


FIG. 89. PAIN THRESHOLD, AGES SIX TO TWELVE

(Gilbert.) *N* = approximately 50 boys and 50 girls at each age.

² See Gilbert, in *University of Iowa Studies in Psychology*, vol. 1, p. 11; Carman, in *American Journal of Psychology*, vol. 10, pp. 392-398.

³ Cook, in *Child Development*, vol. 2, pp. 303-320. See also Gilbert, in *Studies from the Yale Psychological Laboratory*, vol. 2, pp. 40-100.

of red, yellow, green, and blue, with the results shown in Figure 90. The discrimination of shades of the same color does not develop so early. The study of Gilbert (Fig. 91) indicates that at ages seven and eight approximately 50 per cent of the children were unable to discriminate any shades of red, saying that they all looked alike.

Auditory Discriminations. Experimental evidence ⁴ indicates that nearly all normal children have a well-stabilized concept of relative loudness by the age of four years, and in many cases before this. The discrimination of pitch ⁵ has not been measured at the earlier ages, because the child does not understand the nature of the responses required. Considerable improvement in this function occurs after the age of ten years, indicating its relatively late maturity.

Discrimination of Weights. The experiments of Gilbert (Fig. 92) show a rapid improvement between the ages of six and twelve years in the ability to perceive small differences in the weights of objects having the same size and shape. By the latter age discriminations were practically as keen as at maturity. Boys and girls seem very much alike in this trait, no notable sex differences appearing in the data.

Well-known evidence from the Stanford Revision of the Binet Tests is also at hand in regard to weight discrimination. At the age of five, about 70 per cent of children can distinguish the heavier of two weights of three and fifteen grams. By the age of nine years, about 58 per cent of children can arrange weights of three, six, nine, twelve, and fifteen grams in the correct order. Although these performances indicate good kinaesthetic discrimination, Terman ⁶ believes that these are chiefly tests of the ability to follow directions. He states that the task "hardly taxes sensory discrimination at all," and implies that younger children have as great a sheer sensory ability.

Other Senses. Tactual perception has been measured in the

⁴ Williams *et al.*, *The Measurement of Musical Development*, p. 17.

⁵ Seashore, in *University of Iowa Studies in Psychology*, vol. 2, pp. 64-84.

⁶ *The Measurement of Intelligence*, pp. 162, 238.

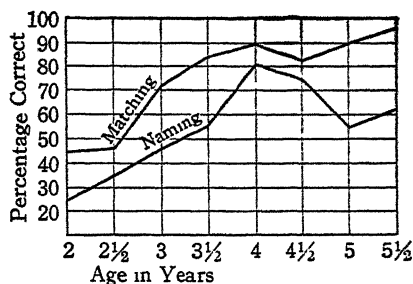


FIG. 90. COLOR DISCRIMINATION OF PRE-SCHOOL CHILDREN

(Cook) Red, green, yellow, blue, various degrees of brightness and of saturation. $N = 110$.

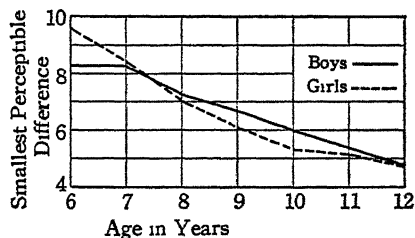


FIG. 91. DISCRIMINATION OF TEN SHADES OF RED, AGES SIX TO TWELVE

(Gilbert.)

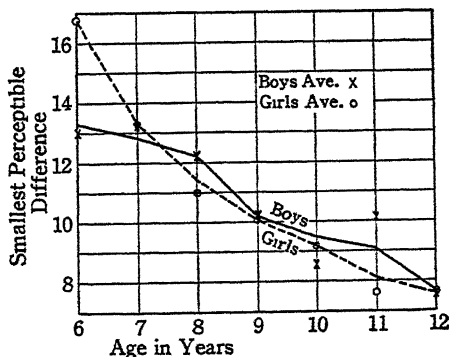


FIG. 92 DISCRIMINATION OF WEIGHT, AGES SIX TO TWELVE

(Gilbert) Curves smoothed $N =$ approximately 50 boys and 50 girls at each age.

psychological laboratory by finding, for certain selected areas of the skin, the minimum distances at which two points, simultaneously applied, are perceived as two points instead of one.

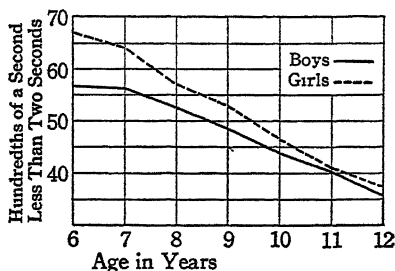


FIG. 93. ERROR IN ESTIMATING AN INTERVAL OF TWO SECONDS, AGES SIX TO TWELVE

(Gilbert.) N = approximately 50 boys and 50 girls at each age. Curves smoothed

six, as Figure 93 demonstrates. Boys seem to excel girls at all of these ages in this sort of perception.

When tactual perception is measured this way, the results seem to show that it decreases during childhood. Retest studies, so far as I have been able to ascertain, have not been made to show the course of development of this capacity throughout childhood.

Boys and girls can *estimate short intervals of time*⁷ more accurately at twelve than at

3. ATTENTION⁸

The power of sustained attention is an important mental function whose development has much significance in the total group of mental capacities.

*Attention During the First Two Years.*⁹ Careful studies of infants have shown that they can give attention at a very early age. This appears as early as the first week, if we may take the child's following a light with his eyes as evidence of his giving attention. We do not know what is going on in the infant's consciousness when his eyes follow bright objects moving in front of them, but probably we have here the beginnings of attention. The ability to watch people usually is established

⁷ Gilbert, *op. cit.*, p. 86.

⁸ See Bickersteth, in *British Journal of Psychology*, vol. 9, pp. 23-73; Pyle, *A Manual for the Mental and Physical Examination of School Children*; Shirley, *The First Two Years*, vol. 2, *Intellectual Development*.

⁹ See Shirley, *op. cit.*, part 2.

before the twelfth week, and after that time the baby can look more or less where he pleases. Between the thirteenth and twenty-third weeks Shirley's study shows that visual attention tends to narrow from a general looking around to looking at a single object, and seems to be significant of development. The *amount* of attention paid to an object, however, apparently has little developmental significance because it does not increase from the third to the sixth month. From the twenty-fifth to the thirtieth weeks the attention given to objects before reaching for them and while holding them increased, but remained constant from then until the forty-seventh week. During the second year visual attention also tends to increase, but the baby's likes and dislikes can readily be observed as playing an increasingly important rôle in his giving attention to an object.

Sustained Attention After the First Two Years. The power of attention increases markedly during the later pre-school and elementary school years, as may be seen in Figure 94. An equally significant fact is the increasing degree to which the child's giving of attention is an index of a growing personality. Doubtless many of the adult's complaints about a child's inability to give attention are merely a wrong appraisal. The child probably is not interested in the thing we want him to at-

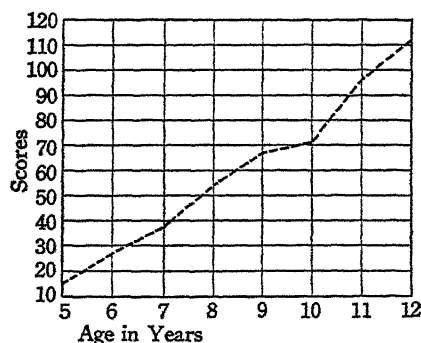


FIG. 94. SUSTAINED VOLUNTARY ATTENTION
(Bickersteth.) Three hundred and seventy girls were tested.

tend to, and he is not as willing as he once was to do distasteful things at the request of others.

Nearly all of the tests used to measure mental and motor capacities also measure some aspects of attention. Speed of discriminative selection, measured by the familiar cancellation test, and various other forms of analytic and synthetic apperception are known to increase until the late teens. The range of attention, as measured by the number of familiar objects perceived in a very short time, seems to increase throughout the elementary school period.¹⁰

Factors Determining Attention. The mental set, attitude, purpose, mood, and interest of the child help to determine the amount of attention he will give to an object or person at any time. The mental ability and previous experiences of the child are also important factors. The internal bodily state of the organism at any time may be of greater significance in determining the child's attention than is the actual situation in which we place him, or the stimuli which we present in an endeavor to secure his attention. As Shirley observes¹¹ in the case of certain tests given to infants three to six months old, the results depend primarily upon the baby's whim, mood, or internal bodily state, and may be an early indication of personality reactions.

That the child's interest in an object or activity is a condition of sustained attention is readily observed. The boy of nine or ten making a skate-o-mobile may spend considerable time trying to put things together. During most of this time his attention may be highly centered upon various features which seem necessary to accomplish his purpose. A girl a little more than five years old had learned to sing "Ewa-yea! my little owlet!" from Longfellow's *Hiawatha* in kindergarten and enjoyed it very much. One Saturday morning she tried to pick it out on the piano. She had taken no music lessons, but had some ability in music. First she picked out the *air* with the left hand in the bass clef. Then she arranged a very pleasing accompaniment with the right hand and played the piece with

¹⁰ See Freeman, in *Psychological Bulletin*, vol. 8, pp. 43-44.

¹¹ *Op. cit.*, p. 173.

both hands. It was a beautiful fall day, but Miss Five-Year-Old stayed at the piano for approximately two hours, intently working out an arrangement that was to her taste. Anyone may observe similar cases in which the child's strong interest keeps him at an activity for a longer period of time than unobserving adults deem possible for young children. Of course, the child's ability and previous experiences are seen to work in the case of this youngster. She grasped the nature of the task and had a good idea of how to do it. With little ability or capacity for doing something, we may well question how long a child will keep his attention upon it. As we have shown elsewhere,¹² keeping the attention upon an object for any length of time probably means, at least in the case of children of the later pre-school ages and above, the ability to see many qualities, relations, and characteristics in it to which he attends. Thus age, previous experience, and mental ability also are potent factors in determining attention.

4. MEMORY

How early does the child show any evidence of retentiveness? How early in infancy does a child remember his mother? How soon does the normal child distinguish family or other familiar persons from strangers? Which does he remember better, sounds or visual impressions? How well does he remember tastes, odors, tactile and kinaesthetic impressions? Does he remember pains? How rapidly does his power of memory develop? Does it reach a maximum during later childhood? Is childhood really the golden age of memory, the time when the child can memorize best, as many people believe? These are a few of the many questions to which we would like conclusive answers. Unfortunately, however, adequate information is lacking on many of them, and our discussions of some of them must be regarded as tentative.

The Infant's Earliest Memories. Adults' earliest conscious memories of childhood are dated at various ages by different

¹² *Psychology of Adolescence*, pp. 68-69.

observers, ranging all the way from the first day after birth until as late as the third year. Several hundred men and women, according to one study,¹³ were very certain of their earliest recollections. The average age of these was approximately three and one-half years. A few reported recollections of events occurring before they were six months old, and several reported memories from between six months and one year. One may well question the validity of such results. Verbal accounts made many years after may be merely verbal formulas which have been recalled from time to time and so kept in mind. An eleven-year-old girl says she remembers when the car in which she was riding went into a ditch. This happened just before she was three. She fell off the seat because the front of the car was so much lower than the back, the front wheels being in the ditch. She can give no details. All she says is that she remembers the car going into the ditch. If she verbalizes this from time to time, she may recall many years from now "the car going into the ditch" when she was three years old. She undoubtedly had a vivid recollection of it for a short time, possibly for a year or two. Many of our memories undoubtedly tend in time to become verbalized in stereotyped form, a brief sentence being all we can recall. In other cases, adults' recollections of early events are influenced by hearing parents or others talk about them a year or longer after the event has taken place. As an adult he may not realize that his recollection is chiefly from hearsay encountered after the event occurred.

Other features of childhood memory, however, probably are of greater importance and can be observed more reliably. Studies of memory have been made by observing the behavior of infants intensively from birth.¹⁴ As early as the eleventh or twelfth week, a baby may show unmistakable signs of memory, as when he recognizes his bottle. Many babies, however, do not show such signs of memory until the eighteenth week or later. A baby 35 weeks old was taken outdoors regularly.

¹³ See Gordon, in *Journal of Delinquency*, vol. 12, pp. 129-132.

¹⁴ See, for example, Shirley, *op. cit.*, pp. 95-98.

When a sweater and cap were put on to prepare for this excursion, he squirmed and squealed with delight. Parents have reported that babies have recognized father and mother at ages ranging from the fifth to the twenty-eighth week, the average¹⁵ being ten or eleven weeks, but such reports may be unreliable because the criterion of recognition is not objective. By the age of six months, babies seem to distinguish familiar persons from strangers. Many children before the age of one year comprehend simple language, because they uniformly make a certain response to questions such as "Where is the kitty?" or "How big is the baby?" By the age of one year a child can remember for a few seconds in which of three small boxes a red and blue toy was placed out of sight.¹⁶ Nearly two-thirds of a group of 100 twelve-month infants made the correct response at the end of ten seconds, approximately three-fifths of them after twenty seconds, a half after thirty seconds, and a fourth after forty-five seconds. Often the child used both hands, reaching to different boxes at the same time. Such responses were recorded as a failure. Bühler¹⁷ refers to a study in which the child seeks an object at a short interval after it has been hidden. At the age of one year a correct response could be made after five minutes. At two years of age, the object could be found after twenty minutes; and at three years, after thirty minutes. The number of objects remembered was one at the age of one, and six at the age of six years.

Memory for Objects, Pictures, and Movements. Children at the age of two can name several objects from seeing the pictures, in one study¹⁸ naming as many as nineteen out of fifty. If we show the child a picture for five seconds and then ask him to find it among a group of fifty pictures pasted on a chart, we find that some of the three- and four-year-old children can make several such responses correctly, a few children being able to make fifteen or more. (See Fig. 95.) Some children spon-

¹⁵ Shirley, *op cit.*, p. 96.

¹⁶ See Allen, C. N., in *Archives of Psychology*, vol 19, no. 127.

¹⁷ *The First Year of Life*.

¹⁸ See Baldwin and Stecher, *The Psychology of the Preschool Child*.

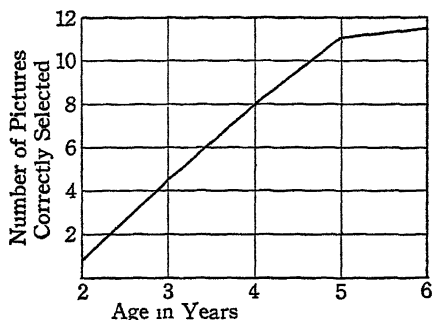


FIG. 95. PICTURE MEMORY, AGES TWO TO SIX YEARS
(Baldwin and Stecher.) $N = 96$.

taneously named the pictures on the chart as they searched for the one they were to find.

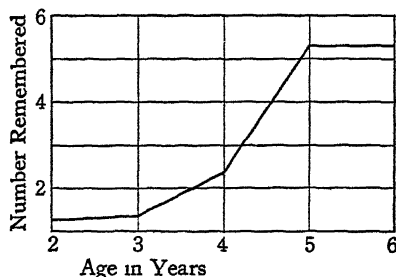


FIG. 96. MEMORY OF MOVEMENTS — KNOX CUBE TEST, AGES TWO TO SIX YEARS
(Baldwin and Stecher.)

The Knox cube test is a test of non-verbal memory. Four blocks are placed in a row. The examiner taps certain of these with another block, touching, for example, the first, third, second, and fourth. He then puts the extra block down. The child picks it up and tries to touch the same blocks and in the same order as the examiner. The tapping sequences can be varied from very easy to very difficult. This kind of memory improves notably during the pre-school and elementary school years, as shown in Figure 96.¹⁹ One of the earliest tests of memory for movements is found in the imitative behavior of

¹⁹ For many other tests devised or adapted for use at pre-school ages, see Baldwin and Stecher, *op. cit.*, and Stutsman, *Mental Measurement of Preschool Children*.

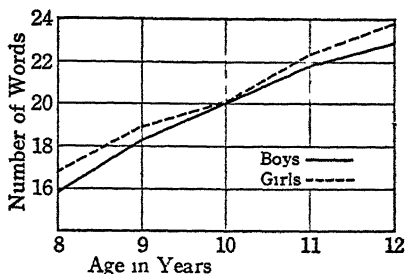


FIG. 97. IMMEDIATE ROTE MEMORY, CONCRETE WORDS

(Pyle, 1920.) $N = 2113$ boys, 2119 girls.

young children. When the child learns to "pat-a-cake," or to perform other similar acts of his infant repertory, he is demonstrating his memory for movements.

Immediate Verbal Memory. By immediate rote memory is meant the number of words that the child can repeat aloud or write down after hearing them read once. Several lists are used, usually containing from three to eight words, including those of both concrete and abstract nature. The gain from the age of eight to that of twelve is slightly less than fifty per cent, and from twelve to eighteen approximately fifteen per cent. As may be seen from Figures 97 and 98, girls excel boys in this performance. Concrete words seem easier than abstract words for both sexes and at all ages. Another form of immediate rote memory is tested by having the child repeat numbers which he has just heard spoken at a moderate but constant

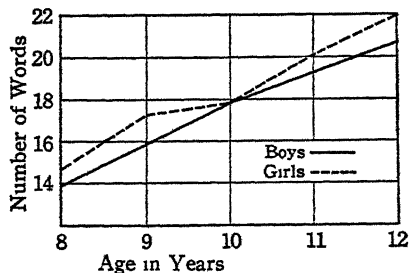


FIG. 98. IMMEDIATE ROTE MEMORY, ABSTRACT WORDS

(Pyle, 1920.) $N = 2112$ boys, 2127 girls.

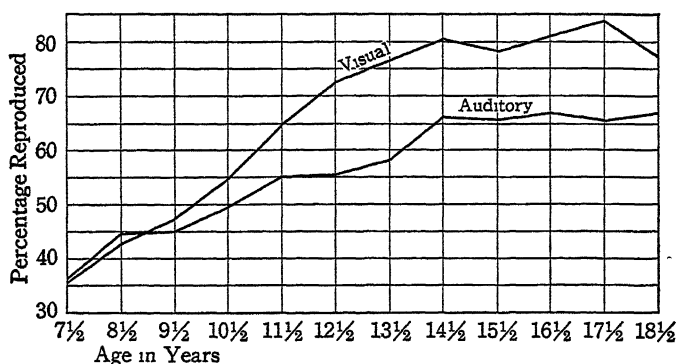


FIG. 99. DEVELOPMENT OF MEMORY FOR DIGITS
(Smedley.)

rate. The numbers range from those having three digits or figures to those having nine. Investigation ²⁰ has shown that the child at four or five years of age can repeat four digits in correct order after one presentation, at ages six to eight, five digits, at nine to twelve, six digits, and at thirteen to fifteen, seven digits. Figure 99 shows the development of memory for digits. It is interesting to note that the visual and auditory presentations are about equally effective at the earlier ages. The visual stimulation becomes superior after the age of ten, when reading habits are well established. Another group of pre-school children (average age 5 years, 6 months) ²¹ had memory spans for various materials as follows:

	AVERAGE		AVERAGE
Digits Forward	5 4	Recall of Pictures	1.6
Syllables	16 1	Recognition of Pictures	6 7
Concrete Words	4 7	Tapping Cubes	5.0
Abstract Words	3 5	Logical Memory	4 5
Digits Backwards	0 0	Commands	3.7

Terman has placed the successful repetition of an increasing number of digits at various levels of the Stanford Revision of the Binet Tests. The tables below give the numbers of digits standardized at various ages, the conditions for success, and the

²⁰ See Starr, in *Psychological Clinic*, vol. 15, pp. 61-84.

²¹ See Hurlock and Newmark, in *Journal of Genetic Psychology*, vol. 39, pp. 157-173.

per cent of children of each age who succeeded, according to the data secured when the test was standardized.²²

AGE	NUMBER OF DIGITS	CONDITIONS	PER CENT PASSING
3	3	1 of 3 trials correct	70
4	4	1 of 3 trials correct	76
7	5	1 of 3 trials correct	74
10	6	1 of 2 trials correct	71
14	7	1 of 2 trials correct	59
Superior Adult	8	1 of 3 trials correct	(62)

From the same source, the immediate memory for sentences of varying length is given as follows:

AGE	NUMBER OF SYLLABLES	CONDITIONS	PER CENT PASSING
3	6-7	1 of 3 trials correct	70
4	12-13	1 of 3 trials correct	83
6	16-18	1 of 3 trials correct *	69
10	20-22	1 of 3 trials correct *	63
16	28	1 of 2 trials correct	(58)

* Or 2 of 3 trials with only 1 error in each.

A number of research studies have dealt with the rote memory for more complex materials, such as poetry and series of nonsense syllables. Figures 100 and 101 give the results of two such experiments.

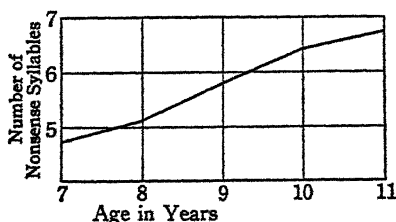


FIG. 100. MEMORY FOR NONSENSE SYLLABLES, AGES SEVEN TO ELEVEN YEARS

(Stroud and Maul.) $N = 172$.

²² Terman *et al.*, *The Stanford Revision and Extension of the Binet-Simon Scale for Measuring Intelligence*.

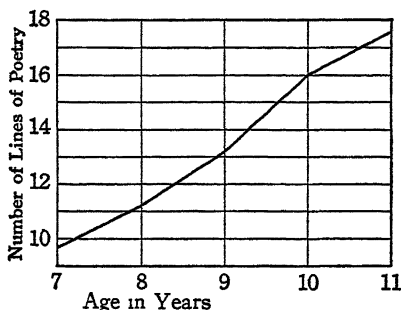


FIG. 101. MEMORY FOR POETRY, AGES SEVEN TO ELEVEN YEARS
(Stroud and Maul.) $N = 172$.

Logical Memory. The development of logical memory or memory of relations is similar to that of rote memory during the pre-school and elementary school years. The customary tests of logical memory require the child to reproduce the "ideas" of a passage read to him. Usually it is given as a group test, the children writing their responses. It has no value at ages six and seven and little value at eight and nine, because the child's scores at these ages are limited by his lack of proficiency in spelling and handwriting. Despite the meager information on the development of this mental function and the unsatisfactory means used in its measurement, it is of much importance in the mental life of the child. It presupposes insight into logical relations, that is, a comprehension of the meaning of passages in which ideas have some sequence and have a significant relation to each other.

Verbal Memory with Delayed Recall or Reproduction. Foster,²³ at the University of Minnesota Institute of Child Welfare, tested the memory of a few children whose ages ranged from two years to more than four years. She read a story to a child, and reread it on nine succeeding days. At the rereadings she paused at certain predetermined places, looked expectantly at the child and waited about two seconds for him to give the word or phrase that followed. On the first reproduction, the children under four years of age did not give many words, but they improved at later repetitions. The most

²³ See *Pedagogical Seminary*, vol. 35, pp. 26-44.

marked improvement was made by those having an average age of 4 years, 3 months. The youngest group, average age 2 years, 11 months, made very little improvement, being inferior on the ninth repetition to the four-year-olds at the first repetition. (See Fig. 102.) Delayed recall was involved in this test to the extent that knowledge of the story remembered from the previous day enabled the child to supply the appropriate words when the examiner paused in the rereading. If children are much interested and if they have a high degree of motivation, they can remember for a longer period of time. Thus, some children at the age of two to three years could remember from one to three days under which one of three plates a cookie had been placed. Children three to four years of age varied widely, their maximum time of remembering ranging from one to twenty-seven days. Children of four to five years could remember from four to thirty-four days.

The Memories of Children and Adults. Are adults more accurate than children in remembering details? Do they re-

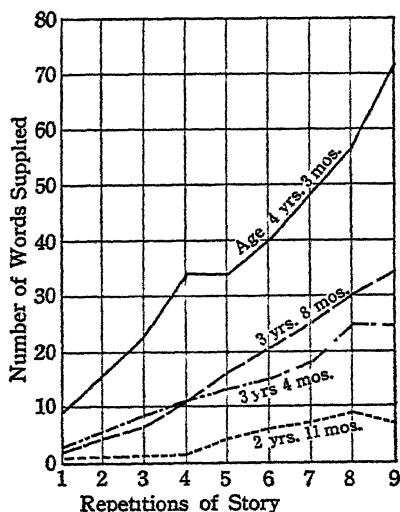


FIG. 102. VERBAL MEMORY OF PRE-SCHOOL CHILDREN

(Foster) $N = 22$. Number of words of a story supplied per child on one to nine repetitions of the story. The examiner read a story each day, for ten days. At the second reading (first repetition) she paused at certain places, looked expectantly at the child, and noted if the child supplied the appropriate word. Several stories were used.

member more of them? Do they remember things longer? Can they memorize more readily?

If we ask children of various ages, and also adults, to report all of the objects they see in a picture which has been observed for one minute, the adults are not likely to do much better than children ten years of age or older. In fact, many adults will do no better than the average child of seven or eight. Part of the adult's failure to see more details in the picture may be due to his lack of interest in the test. His cooperation is only half-hearted, while the child is more interested in the picture.

In all measurement of abilities we face the same problem, that of keeping motivation constant as difficulty varies. If interest and effort factors are variable between different age or maturity groups, we must not infer too definitely and conclusively that the differences in performance truly represent the differences in ability. In other words, if the score or performance is determined by two or more factors combined in unknown proportions, we have no statistical or other technique for treating the results so as to know the influence of each element separately. To disregard a factor which may have an effect on the result is merely to assume, consciously or unconsciously, that it has no effect. One important obstacle to adequate investigation of differences in various abilities at a wide range of ages is to find enough test situations which form a series graded in difficulty and also evoke similar effort at each age level.

The type of material, as related to the individual's past experiences and present interests, and its difficulty are factors that help determine the amount one remembers. Specialized interest and training give direction to one's specific abilities at any time. If we ask an adult for details along some line of special interest, as the machinist for details of a picture of some complicated machine, we expect him to remember many more items than would an adult having little experience along this line. The child, whose experience of the thing in question is even more limited, will do still more poorly. Specialized training or experience, by giving an individual the vocabulary of a special field, enables him to excel in giving details. The

alert boy of twelve, or some adult, might remember many of these things, but, not knowing their names, he could not report them other than as "small, round somethings or other." The very absence of a name for an object hinders one in quickly cataloguing it. He has to look it over more carefully so as to recall its size, shape, or color. The evidence indicates that the more detailed kinds of memory develop chiefly after the age of twelve. Logical memory is closely related to other complex mental functions which continue developing until the late teens or longer. Accordingly, the adolescent or adult probably has this function better developed than during childhood.

The Golden Age for Memory. Is childhood, then, the golden age for memory, as many people believe? Is it the time when the individual can memorize best? Apparently, the best time to memorize is when one needs to do so. The older notion of childhood as a time to store up information for later use was based upon the view that the child at that time could memorize best, but could not reason. Neither conclusion seems to have any foundation in careful observation or experimental investigation.

In a number of experiments, children of various ages, and adults, have been given the same memory tests. In the simpler functions, such as rote memory, the mature level is gained at an early age, and no great improvement occurs afterward. This is illustrated in Figure 99 which shows memory for digits. In more complex functions, growth continues for a longer period and the top level may not be reached until the early twenties. While the memorizing ability of an adult may be no better than that of a child in some instances, no evidence exists indicating that an adult's memory ever becomes worse than that of a child, at least before the onset of senility. Childhood, then, is not a "golden age" for memory.

5. JUDGMENT AND REASONING ²⁴

How early does a child form judgments? How soon does he reason? Is it true, as some have said, that reason is born dur-

²⁴ For discussions of the general nature of reasoning, judgment, and reflective thought, consult texts on General Psychology.

ing adolescence, or, according to others, that during pre-adolescence there is "even a foreshadowing of reason"? Is it true, as someone has declared, that no evidence has been found of any specific process of thought which could not be performed by a child of seven?

Reasoning Present During Childhood. The accumulating mass of evidence indicates clearly and unmistakably that children reason at an early age, that they can form inferences upon the basis of reduced cues from past experience. A little fellow of two was pulling the hairs on his father's wrist. He was reproved by his father, who said, "Don't, Donald, it hurts daddy." To this the little fellow replied, "It didn't hurt grandpa." A little girl of three planted a dime which had been given her, saying to her mother, "Now we'll have lots of ten cents." A girl of four, trying to tell her father something, was being teased by his jabbering constantly so she could not do so. The telephone rang; he turned on a light over the telephone table and answered it. She stood at his chair until he had finished. He turned off the light and began jabbering again. She stamped her foot and said, "Listen, I'll put you in that light and turn you off. I've something to say." Of course, Donald's inference was wrong, as was that of the three-year-old on planting her dime, or that of the four-year-old on putting her father in the electric light and "turning him off." But do adolescents and adults never make any wrong inferences? Is their use of reduced cues always without error? One does not dare to set up correct use of knowledge as the criterion of reasoning. Erroneous inferences and wrong solutions are found all about us. Children, adolescents, adults, all persons, regardless of age, make false moves in their thinking.

Young children also make judgments, and as early as three or four they may make generalizations. A child of three and one-half years said to her father who had hurt his hand at some work, "Little girls' daddies shouldn't hurt themselves, because little girls love their daddies." In the seven-year tests on the Stanford-Binet intelligence test we find children required to tell

the difference between a fly and a butterfly, a stone and an egg, wood and glass. At the age of eight, the average child can tell in what way coal and wood, an apple and a peach, iron and silver, a ship and an automobile are alike. At age twelve a test calls upon the child to tell in what way *three* things are alike, such as a snake, a cow, and a sparrow; a book, a teacher, and a newspaper; wool, cotton, and leather; a knife-blade, a penny, and a piece of wire; a rose, a potato, and a tree.²⁵

The Reasoning of Pre-School Children. Much insight into children's mental abilities can be secured by watching their behavior under carefully arranged conditions. When placed in situations in which they must take a ring off a hook, pull a string, or use a stick, to bring within reach a basket containing an animal cookie, children from two to four years of age make a variety of responses in solving the problem. The most frequent responses reported in one study²⁶ were manipulation, pointing, and reaching, which usually are classed as trial-and-error reactions. Only rarely did a child hit upon a solution without preliminary manipulation. Problem-solving of these sorts is dependent upon age and mental ability. Older children do better and children having more intelligence (as measured by an individual intelligence test) also excel those less gifted. In other types of problem-solving or reasoning,²⁷ the child's ability also increases with age. The majority of children at three may not see the problem as a problem. They merely wish to secure some object in order to play with it, whereas from the age of six the problem is recognized as a problem. *Securing* the object is not the point, but *finding* the way to get it.

Children's Reasoning from Six to Twelve Years. The child's ability to reason continues to develop throughout childhood and on into adolescence as may be seen from their scores on various reasoning tests (Fig. 103), and from detailed examinations of their behavior when confronted by increasingly complex problem situations. The development of concepts proceeds as the

²⁵ See also Hazlitt, in *British Journal of Psychology*, vol. 20, pp. 354-361.

²⁶ See Matheson, in *Child Development*, vol. 2, pp. 242-262.

²⁷ See Heidbreder, in *Pedagogical Seminary*, vol. 35, pp. 522-544.

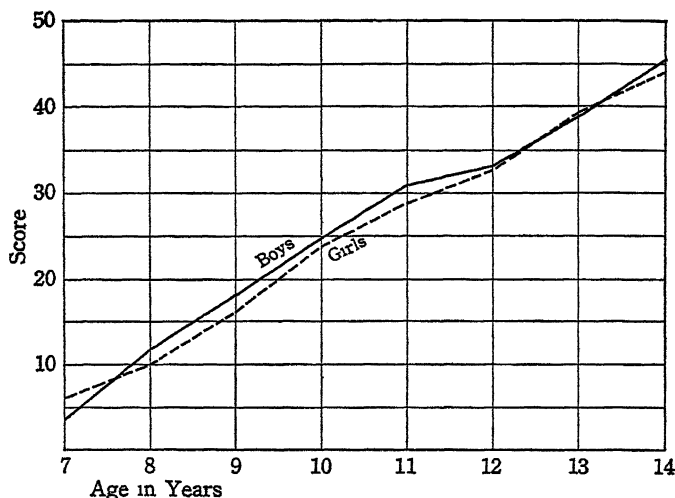


FIG. 103. DEVELOPMENT OF REASONING, AGES SEVEN TO FOURTEEN YEARS
(Burt.)

child grows older and has more experience and maturity. These reduced cues serve to facilitate his handling more difficult problems.

Cyril Burt²⁸ has devised a series of 50 graded reasoning tests from which the following samples are chosen. They indicate roughly the growth in power of reasoning from the seventh to the thirteenth years.

Seven years.

Test No. 1. Tom runs faster than Jim; Jack runs slower than Jim. Who is the slowest — Jim, Jack, or Tom?

Test No. 7. I have bought the following Christmas presents: a pipe, a blouse, some music, a box of cigarettes, a bracelet, a toy engine, a bat, a book, a doll, a walking stick, and an umbrella. My brother is 8; he does not smoke, nor play cricket, nor play the piano. I want to give the walking stick to my father and the umbrella to my mother. Which of the above shall I give my brother?

²⁸ See *Journal of Experimental Pedagogy*, vol. 5, pp. 68-77, 121-127. Quoted by special arrangement with the publishers.

Eight years.

Test No. 10. I don't like sea voyages, and I don't like the sea-side. I must spend Easter either in France, or among the Scottish Hills, or on the South Coast. Which shall it be?

Nine years.

Test No. 16. Three boys are sitting in a row: Harry is to the left of Willie, George is to the left of Harry. Which boy is in the middle?

Ten years.

Test No. 25. There are four roads here. I have come from the South and want to go to Melton. The road to the right leads somewhere else; straight ahead it leads only to a farm. In which direction is Melton — North, South, East, or West?

Eleven years.

Test No. 31. Where the climate is hot, aloes and rubber will grow; heather and grass will only grow where it is cold. Heather and rubber require plenty of moisture; grass and aloes will grow only in fairly dry regions. Near the river Amazon it is very hot and very damp. Which of the above grows there?

Twelve years.

Test No. 37. I started from the Church and walked 100 yards; I turned to the right and walked 50 yards; I turned to the right again and walked 100 yards. How far am I from the Church?

Thirteen years.

Test No. 40. A pound of meat should roast for half an hour; two pounds of meat should roast for three-quarters of an hour; three pounds of meat should roast for one hour; eight pounds of meat should roast for two hours and a quarter; nine pounds of meat should roast for two hours and a half. From this can you discover a simple rule by which you can tell from the weight of a joint how long it should roast?

Children's Errors in Reasoning. Children's errors in reasoning and problem-solving sometimes may seem ludicrous, but an analysis of them is valuable for diagnosing learning difficulties. Thus, part of a reading test is as follows: "In Franklin, attend-

ance upon school is required of every child between the ages of seven and fourteen on every day when school is in session, unless the child is so ill as to be unable to go to school, or some person in his house is ill with a contagious disease, or the roads are impassable." The first question on this is, "What is the general topic of the paragraph?" Pupils in the fifth and six grades²⁹ who answer it incorrectly may say, "Franklin," "In Franklin," "Franklin attends to his school," "An inch and a half," "Leave half an inch space," etc. These last errors clearly are induced by the child's attempting to answer the question, "What is a paragraph?" when his conception of the meaning of a paragraph consists in remembering the teacher's repeated admonitions to leave a margin or to indent at the beginning.

A bright child first coming upon multiplication of a two-place number by a one-place number may reason incorrectly, as when he multiplies 74 by 6 and gets 4224 as the answer, merely by first multiplying 7 by 6 and putting down 42, and then multiplying 4 by 6 and putting down 24 to the right of 42.

$$\begin{array}{r} 74 \\ 6 \\ \hline 4224 \end{array}$$

In many schools children used to be given problems beyond their comprehension. They were taught rules which had little meaning for them, but by constant drill some of them finally were able to say back to the teacher the words upon which the teacher had drilled them. The following account of the reasoning of the dull boy and the bright boy in a seventh grade in Scotland is illuminating.³⁰ The problem was, "If 7 and 2 make 10, what will 12 and 6 make?"

A look of dismay passed over the seventy-odd faces as this apparently meaningless question was read. Everybody knew that 7 and 2 didn't make 10, so that was nonsense. But even if it had

²⁹ See Thorndike, in *Journal of Educational Psychology*, vol. 8, pp. 323-332.

³⁰ From Adams, *Exposition and Illustration in Teaching*, pp. 176-178. New York, The Macmillan Company. Quoted by special arrangement with the publishers.

been sense, what was the use of it? For everybody knew that 12 and 6 make 18 — nobody needed the help of 7 and 2 to find that out. Nobody knew exactly how to treat this strange problem.

Fat John Thomson, from the foot of the class, raised his hand, and when asked what he wanted, said:

"Please, sir, what rule is it?"

Mr. Leckie (the teacher) smiled as he answered,

"You must find out for yourself, John; what rule do you think it is now?"

But John had nothing to say to such foolishness. "What's the use of giving a fellow a count (problem) and not telling him the rule?" — that's what John thought. But as it was a heinous sin in Standard VI (seventh grade) to have "nothing on your slate," John proceeded to put down various figures and dots, and then went on to divide and multiply them time about.

He first multiplied 7 by 2 and got 14. Then, dividing by 10, he got $1\frac{4}{5}$. But he didn't like the look of this. He hated fractions. Besides, he knew from bitter experience that whenever he had fractions in his answer he was wrong.

So he multiplied 14 by 10 this time, and got 140, which certainly looked much better, and caused less trouble.

He thought that 12 ought to come out of 140; they both looked nice, easy, good-natured numbers. But when he found that the answer was 11 and 8 over, he knew that he had not yet hit upon the right tack, for remainders are just as fatal in answers as fractions. At least, that was John's experience.

Accordingly, he rubbed out this false move into division, and fell back upon multiplication. When he had multiplied 140 by 12, he found the answer 1680, which seemed to him a fine, big, sensible sort of answer.

Then he began to wonder whether division was going to work this time. As he proceeded to divide by 6, his eyes gleamed with triumph.

"Six into 48, 8 an' nothin' over — 2—8—0 an' no remainder. I've got it!"

Here poor John fell back in his seat, folded his arms, and waited patiently till his less fortunate fellows had finished.

James knew from the "if" at the beginning of the question that it must be proportion; and since there were five terms, it must be compound proportion. That was all plain enough, so he started, following his rule:

"If 7 gives 10, what will 2 give? — less."

Then he put down

"Then if 12 gives 10, what will 6 give? — again less." So he put down this time

12:6

Then he went on loyally to follow his rule: multiplied all the second and third terms together, and duly divided by the product of the first two terms. This gave the very unpromising answer $1\frac{3}{7}$.

He did not at all see how 12 and 6 could make $1\frac{3}{7}$. But that wasn't his lookout. Let the rule see to that.

Detecting Absurdities. The ability to detect absurdities involves reasoning. It seems to develop more rapidly after the age of eleven than before. Terman and Merrill³¹ list the detection of such absurdities as the following at the ten-year level:

- (a) In the year 1915 many more women than men got married in the United States.
- (b) A man wished to dig a hole in which to bury some rubbish, but could not decide what to do with the dirt from the hole. A friend suggested that he dig a hole large enough to hold the dirt, too.
- (c) They began the meeting late, but they set the hands of the clock back so that the meeting might surely close before sunset.
- (d) There was a railroad accident yesterday, but it was not very serious. Only forty-eight people were killed.
- (e) A bicycle rider, being thrown from his bicycle in an accident, struck his head against a stone and was instantly killed. They picked him up and carried him to the hospital, and they do not think he will get well again.

Cyril Burt³² has prepared the following absurdities test on which English children from eight to fourteen years of age made scores as shown in Figure 104. The score is the number of absurdities detected.

A SUNDAY IN FRANCE

Ten years ago on a pleasant summer's afternoon in the middle of January, 1916, the twelve o'clock express from Scotland was rushing past the busy terminus of the Great Western Railway at twelve miles an hour.

³¹ *Measuring Intelligence*, p. 165.

³² *Mental and Scholastic Tests*, p. 237. Quoted by permission of P. S. King & Son, Ltd. London publishers.

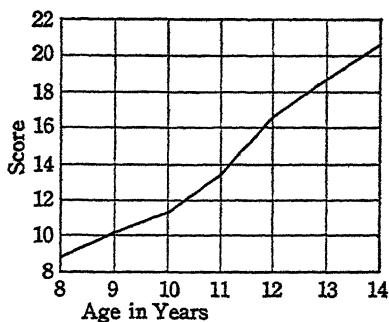


FIG. 104. SCORES OF ENGLISH CHILDREN ON BURT'S ABSURDITIES TESTS,
AGES EIGHT TO FOURTEEN
(Burt.)

A clean-shaven young Englishman, of about fifty years of age, stepped lightly from one of the first-class carriages and hurried slowly down the platform with both hands in his pockets, carrying a heavy bag, and gaily curling the tips of his moustache. His strange voice suggested that he was a native of Germany, born and bred, no doubt, in Paris; and by his dusty shoes I gathered he had walked over from New York that very morning.

There was not a cloud in the sky; and, as the rain was still falling heavily, he took off his mackintosh and strolled out into the crowded streets of the city. The ripening fields of corn through which he passed were turning golden as the sun set in the south. The square semi-circle of the new moon shone brightly in the heavens overhead. The evening shadows grew shorter and shorter in the twilight. And a few minutes later, with a burst of splendour, the day dawned.

He was standing on London Bridge watching the gray waters of the Severn rush northwards out to sea, and listening to the bleating of the sheep on Hampstead Heath. A few feet above his head an aeroplane was standing still in the sky; and beyond in the cloud a bright red seagull, with its four broad wings outspread, could be seen flying invisibly above the Dutch mountains. The clock on the dome of St. Paul's struck the hour. One, two, three, he counted, and then ten more strokes. "It must be just half-past eleven," he said; "no wonder I am thirsty. I must call at a greengrocer's for a glass of salt beef."

Differences Between Children's and Adults' Reasoning. It has already been concluded that children's reasoning cannot be

separated from that of adults upon the grounds of right or wrong inference. The work of Hazlitt and of Heidebreder indicates not only that children reason, but that their thought processes are much the same as those of the adult. When the adult is faced with entirely unfamiliar problems he makes essentially the same mistakes as does the child. Important differences in Heidebreder's study were as follows: (a) the younger children made many more reactions and fewer solutions than the older ones, as may be seen from the following:

AGE GROUP	NUMBER OF PERSONS	NUMBER OF REACTIONS	NUMBER OF PROBLEMS SOLVED
3 years	10	665	3
4 years	10	549	17
6-10 years	10	278	30
Adults	10	90	30

(b) adults reacted to the problem as a problem, whereas younger children paid more attention to the concrete features of the situation; (c) adults and older children took a more objective attitude toward the problem.

A danger in comparing the reasoning of children and adults lies in assuming that thinking is identical with ability for verbal expression and that if a child does not see or grasp a relation in regard to one sort of subject-matter, he cannot do it in regard to any other. It is at this point, however, that a noticeable difference does occur. Many situations are too complex — require too much maturity and experience — for younger children to solve. The verbal elements really simplify for adults some very complex problems which are beyond the ability of young children to solve, not only because of the verbal elements, but because of the abstract nature of the relations involved. If given a problem within their range of experience and maturity, children reason much as adults do. Thus their reasoning seems to differ from that of adults more in degree than in kind, because, even at the pre-school level, we find them using many of the same processes of comparison, generalization, inference, and cue reduction.

SELECTED REFERENCES

Meek and Jersild, in *Review of Educational Research*, vol. 6 (February, 1936), pp 35-48, review recent literature on the development of memory, imagination, attention, perception and concepts, moral and aesthetic judgments, and interests, to the time of puberty.

Baldwin and Stecher, in *Psychology of the Preschool Child*, chaps. 5-7, present data on the development of perception, association, language, rhythm, design, proportion, and concepts of weight, time, and number, up to the age of six years; Gesell, in *The Mental Growth of the Pre-School Child*, chap. 10, also gives developmental norms up to the age of five years and in chaps 28, 29, and 32 gives data on precocity and superiority, retardation and inferiority, and presents normative summaries on various kinds of development, Jersild, in *Child Psychology*, chap 9, gives a good account of the child's growth in understanding; Piaget, in *Judgment and Reasoning in the Child*, attempts to trace the development of these mental functions between the ages of two and eleven years; Shurley, in *The First Two Years*, vol. 2, *Intellectual Development*, chaps. 6-16, indicates the tests used and the results of extensive studies of twenty-five babies from birth to two years of age; Stern, in *Psychology of Early Childhood*, chaps. 6, 15-20, 27-29, discusses the various mental functions and their development to six years; Stoddard and Wellman, in *Child Psychology*, chaps. 4 and 5, present the evidence from experimental studies on sensory discrimination and concepts and thinking

Additional references are given at the end of this volume.

CHAPTER IX

THE GROWTH OF INTELLIGENCE

THE existence of general mental ability or intelligence is widely recognized both in popular thought and in psychological research. It not only includes the particular mental functions considered in the preceding chapter but also embraces something more than merely the sum of such separate abilities. Some of the questions which this chapter seeks to answer are the following: What is intelligence? At what rate does it grow in early childhood and in later childhood? To what extent does it vary from year to year? Do children keep about the same ranks in intelligence as they mature, or is there considerable fluctuation? Is the brightest child in a group at age four, for example, the brightest at age five or six, or does he lose his rank and become like the average in mental ability? Do children become more alike in intelligence as they pass from the pre-school years to later childhood, or do they become less alike? What factors affect mental growth?

I. THE MEANING AND ORGANIZATION OF INTELLIGENCE ¹

Definitions of Intelligence. Intelligence often has been defined as capacity to learn. Some writers have argued that

¹ For a more adequate discussion of the nature and measurement of intelligence see the following: Binet, *Les idées modernes sur les enfants*; Binet and Simon, "L'intelligence des imbéciles," in *L'Année Psychologique*, vol. 15, pp. 1-147; Dearborn, *Intelligence Tests*; Freeman, *Mental Tests*; Gesell, *Mental Growth of the Pre-School Child*; Goodenough, *Measurement of Intelligence by Drawing*; Kuhlmann, *A Handbook of Mental Tests*; Linfert and Hierholzer, *A Scale for Measuring the Mental Development of Infants During the First Year of Life*; Peterson, *Early Conceptions and Tests of Intelligence*; Pintner, *Intelligence Testing*; Spearman, *The Nature of Intelligence and the Principles of Cognition*; Stutsman, *Mental Measurement of Preschool Children*; Terman, *The Measurement of Intelligence*; Thorndike, *The Measurement of Intelligence*; and Thurstone, *The Nature of Intelligence*.

tests of ability to learn have thus far proved inferior to other tests in measuring intelligence, as defined by other acceptable criteria. Part of the difficulty may lie in the fact that a battery of intelligence tests of the usual type samples many diverse mental functions, whereas the tests used to measure learning capacity often have measured the learning of some one thing only. A battery of learning tests, sampling the child's ability to learn many different sorts of things, probably would be more satisfactory. A practical objection to such a battery of tests, however, lies in the amount of time required to secure an accurate valid measure of learning capacity. In spite of these objections, the concept of intelligence as capacity to learn has a certain value. Both Stern's view that intelligence is "the general capacity of an individual consciously to adjust his thinking . . . to new problems and conditions of life" and the often expressed definition that intelligence is the capacity to "adapt to relatively new situations" seem to indicate that intelligence includes the ability to learn. Capacity to learn is involved in making adjustments to new and complex situations in life, such as solving problems in engineering, medicine, statecraft, economics, social relations, mathematics, chemistry, philosophy, agriculture, and business.

Binet² proposed an interesting and useful view of intelligence. He said, "Comprehension, invention, direction, and criticism — intelligence is contained in these four words." He contrasts the mental capacity of the normal child with that of the adult, showing that the former is deviating, inconstant, and capricious, as compared with the adult in the direction of his activities; that his comprehension is superficial; that his power of invention is somewhat more limited; that he lacks much of the power of auto-criticism, judging "poorly the accuracy of what he says and does"; and that he is more readily satisfied by superficial or absurd reasons. On the whole, Binet's characterization has a great deal of value and shows his remarkable insight. We can readily observe adults whose powers of auto-criticism are limited, who give little reflective

² *Les idées modernes sur les enfants*, p. 118.

thought to the evaluation of possible lines of activity, and who lack in these other capacities. We think of them as being persons of less intelligence than those who possess more of these four qualities. Adapting oneself effectively to relatively new situations involves these traits in large measure.

A few years ago some American psychologists discussed the nature and measurement of intelligence as follows:³

Colvin: "An individual possesses intelligence in so far as he has learned, or can learn, to adjust himself to his environment."

Haggerty: "A group of complex mental processes traditionally defined in systematic psychologies as sensation, perception, associations, memory, imagination, discrimination, judgment, and reasoning," excluding "emotions, instincts, will activities, and so-called character traits."

Terman: "An individual is intelligent in proportion as he is able to carry on abstract thinking."

Thurstone: "Intelligence as judged by everyday life contains at least three . . . components: (a) the capacity to inhibit an instinctive adjustment; (b) the capacity to re-define the inhibited instinctive adjustment in the light of imaginably experienced trial and error; and (c) the volitional capacity to realize the modified instinctive adjustment into overt behavior to the advantage of the individual as a social animal."

More recently Thorndike⁴ has given his conception of intelligence and intelligence testing. He says:

Any system of units of measurement that is to be adequate must then apparently be flexible enough to apply to a wide variety of operations such as we may call attention, retention, recall, recognition, selective and relational thinking, abstraction, generalization, organization, inductive and deductive reasoning, together with learning and knowledge in general.

Intelligence, according to an analysis made by Thorndike, has four important aspects — altitude or level, range or width, extent or area, and speed. Other things equal, the person has greater intelligence if he can perform *harder* tasks, if he can mas-

³ *Journal of Educational Psychology*, vol. 12, pp 123-147, 195-216, 271-275. Quoted by permission of Warwick and York, Inc., publishers.

⁴ *The Measurement of Intelligence*, p. 22.

ter a *greater number* of tasks of equal difficulty, or if he can produce the correct response more *quickly*. Many of our intelligence tests put emphasis upon difficulty and speed of response. Problems are placed so as to become increasingly difficult, opposites are arranged from easy to difficult, reading materials emphasize difficulty, substitution tests place a premium on speed of learning relatively simple material, and the short time allowed on many tests helps to emphasize speed.

Obviously, the altitude or level of intellect is its most valuable aspect. The more complex the problems of life which are presented for solution become, the more significant is altitude of intellect. On this Thorndike ⁵ says:

From the economic and philanthropic points of view, altitude is enormously more important. If an intellect could be hired from Mars of so high a level that it could learn how to prevent war as easily as Jenner learned how to prevent smallpox, a million dollars a day would be a cheap wage for the earth to pay him.

Dearborn ⁶ regards very highly Ballard's definition of intelligence, "the relative general efficiency of minds measured under similar conditions of knowledge, interest, and habituation."

The Organization of Intelligence. The problem of the nature and organization of intelligence has received much attention, both theoretical and experimental. From the mass of data and of interpretations, two theories of intelligence stand out prominently. One holds that intelligence is a closely coordinated unitary attribute. The other theory indicates that it is the arithmetical sum of a series of varied and unrelated abilities. These two points of view deserve a more extended description.

*Spearman's Two-Factor Theory.*⁷ Spearman holds that all mental abilities, upon analysis, may be resolved into two components or factors. The first of these is a general factor known as *g*, found to some extent in all mental abilities, which may be regarded as a sort of highest common divisor found for prac-

⁵ *Op. cit.*, p. 35.

⁶ *Op. cit.*, p. 94.

⁷ See *op. cit.*, and *The Abilities of Man*.

tically all mental performances. This general or common factor is responsible for the relationships (usually positive, though in many cases slight) which are found between various abilities. A second group includes special factors which Spearman has designated *s*. These are held to be more or less specific to particular abilities, activities, or situations. Loosely organized traits or abilities are made up largely of specific factors; they have very little of the general or common factor. The correlations between such traits are low. Abilities which are closely organized or integrated are said, according to this theory, to possess much of *g*. Besides the essentially intellectual *g* factor and the highly specific *s* factors, mental activity involves general volitional factors, *w*, which seem to be related to personality, and certain *group factors* which are less general than *g* or *w*, but are found common to a wide range of mental activities, such as musical ability or mechanical ability. In this arrangement, intelligence is *g*, and is single and unitary. Although elaborate mathematical and statistical data are presented in support of these views, students of human nature are not in complete agreement upon the interpretation of them.

*Thorndike's Multi-Factor Theory.*⁸ Thorndike holds that we have intelligences, rather than intelligence, and that intelligence should be defined in terms of the kinds of tasks that are performed. Intelligence, according to this point of view, is the ability to do intellectual tasks. As many intelligences can be distinguished as there are different varieties of intellectual tasks. Thorndike's fundamental theory of intelligence is quantitative. The good intellect is noted principally by its large number of associations or connections, rather than by the possession of a different quality. He writes, "The person whose intellect is greater or higher or better than that of another person differs from him in the last analysis in having, not a new sort of physiological process, but simply a larger number of connections of the ordinary sort."

This theory of intelligence as the sum of all of the capacities of the individual is supplemented by Thorndike's analysis of

⁸ Thorndike *et al.*, *The Measurement of Intelligence*.

the altitude, range, and speed of persons in intellectual performances, which has already been described.

Abstract, Mechanical, and Social Intelligence. Most of the discussions of intelligence deal with the abilities to manipulate abstract symbols of various sorts. It is recognized that the abilities to deal with words, ideas, and symbols are imperfectly correlated with some other kinds of meritorious performances. Some persons who are not brilliant in symbolic performances have unusual aptitude for mechanical pursuits, while others are exceptionally skillful in dealing with people. Hence the distinction is often made between *abstract, mechanical, and social* intelligence.

No one doubts the importance of abstract intelligence. This type of ability functions in most of the discoveries made in the fields of science, industry, or finance. It operates in the creation of serums, dyes, electrical refrigeration, city planning, monetary systems, religious ideas, and philosophies of life. In relation to children's performances, there is little doubt that abstract intelligence contributes more to academic success at any level of school than do the other categories of intellect.

Less is known about the nature and development of mechanical intelligence than about abstract intellect, although a considerable amount of research has been conducted.⁹ It seems reasonable to suppose that individuals having considerable mechanical ability and relatively less of the verbal and intellectual ability possess mechanical intelligence. The two kinds are not inversely related, however, so that the individual possessing much of the one possesses little of the other, and *vice versa*. Cases are found, however, in which the person with an average amount of one has a large amount of the other, and these, it seems, can be best understood by assuming both an intellectual kind and a mechanical kind of intelligence.

The value or importance of social intelligence is generally recognized, even though it may be referred to as executive, ad-

⁹ For an excellent discussion of the nature of mechanical ability and its measurement, see Paterson et al., *Minnesota Mechanical Ability Tests*, especially chaps. 8-14; for other tests of mechanical aptitude, see MacQuarrie, in *Journal of Personnel Research*, vol. 6, pp. 329-337, and Stenquist, *Measurement of Mechanical Ability*.

ministrative, managerial, or other ability. We may see its beginnings in the pre-school child's ability to dominate or handle others in relatively simple situations.

Sometimes reference is made to *artistic* intelligence or ability as a fourth type, but it is doubtful whether the relationships between various kinds of artistic ability are close enough to cause them to be regarded as one sort of capacity. From the available evidence, it seems that ability in music does not necessarily bear any close relationship to ability in drawing, painting, or sculpture. Ability to handle form and color is different from the ability to manipulate sound and rhythm. At present it seems that the three-fold classification is of more value than any that would include a fourth category.

Proposals have been made to include mechanical and concrete aspects of behavior in a broad concept of general intelligence. We may accept these proposals and regard intelligence very broadly, but we doubt the value of trying to include, in one measure of intelligence, tests of ability to deal with abstract ideas, symbols, and involved relations, and tests of ability to handle relatively concrete situations. The correlations between these two diverse kinds of abilities are very low, particularly among older children and adults. Tests to measure each important aspect of intelligence seem preferable. In discussing growth of intelligence from birth to the age of twelve years we consider growth as measured by the different tests which have been used. Those for the earlier years of the child's life, of necessity, consist principally of materials relating to concrete, visual-motor responses. They seem to be somewhat symptomatic of the abstract sort of intelligence, probably because, at these early ages, such relatively simple concrete, visual-motor responses make demands upon the more intellectual processes of the highly immature, inexperienced organism.

2. TERMS USED IN DESCRIBING MENTAL GROWTH

At one time it was possible to describe a child's mental ability only by saying that he was very good or very poor, very

bright or very stupid. One could also tell his score on a test made up of several tasks, that, for example, he had done correctly ten from a list of twenty-five exercises, problems, or items on a test. We could then say he had a score of 40 per cent on the test. Whether, however, we said he was "very bright" or made a score of 40 per cent on a test, we could not with this information alone tell *how* bright he was or how well he had done on a test. It seems strange to some of us today that better descriptive techniques were not devised until the first decade of the present century.

Mental Age. The concept of mental age is a very useful one, first employed in the modern experimental sense by Binet²⁰ in 1908. By mental age is meant the average mental ability of a group of children of a given chronological age. Thus, we say a child has a mental age of six years on a test if he passes the same number of items or exercises on it, or makes the same score, as the average of a typical group of six-year-olds. He has a mental age of four years if he does as well as the average four-year-old. If a child at six has a mental age of four years, not only do we know that he is retarded, but we can state quantitatively he is retarded two years in mental development.

Intelligence Quotient or I.Q. Another useful way of describing a child's mental status is to state his intelligence quotient, which is mental age divided by his chronological age. An eight-year-old child having a mental age of six years has an I.Q. of 75 (in the United States we omit the decimal point). The I.Q. tells us something of the child's degree of brightness. Mental retardation has more significance if it takes into account the chronological age. Thus a retardation of two years at the age of eight years is not as significant as a retardation of two years at a chronological age of four or five. The significance of such deviations is made clearer by the use of the I.Q. In the former case it is 75; in the latter 67 or 60, respectively. The I.Q. has been very widely used and is famil-

²⁰ The term was mentioned as early as 1828. Chaille, in *New Orleans Medical and Surgical Journal*, vol. 14, pp. 893-912, suggested in 1887 that mental-age standards be used, but apparently the idea was not used and probably remained unknown to the scientific or psychological world until Binet used it with his 1908 intelligence tests.

iar to most teachers and students of education and psychology.

Percentile Ranks. Another way of indicating a child's intelligence is to tell his percentile rank in some group, usually (and preferably) in an unselected group of children of the same age. Thus, if we say a child of eight scores at the seventieth percentile rank in a group of eight-year-old children, we mean that his score on the test is higher than that of sixty-nine per cent of the group. This is a very useful way to describe his standing on mental and educational tests. Its meaning easily can be made clear to persons with little or no psychological training and can be used with parents, teachers, and others who have contacts with the child. In some respects, an even more important advantage lies in the fact that the percentile rank compares the child with others of the same chronological age and thus avoids the danger of assuming that two children of the same mental age are alike in mental ability even though they have different chronological ages. Take, for example, two children each having a mental age of four years, one of whom is four years old, the other twelve. They are alike in intelligence in the very narrow limited sense that they secure the same scores on some mental test which, at best, samples only a small area of their abilities. If we consider I.Q.'s, the one rates 100, the other 33. This indicates, of course, that they are quite different. Also, two other children, each having an I.Q. of 100, might mistakenly be considered very much alike, although if one is four years old and the other twelve, they, obviously, have vastly different mental abilities. In a very real sense, then, either mental age or intelligence quotient disregards the maturity that comes with age and experience. If, now, instead of using mental ages or intelligence quotients, we limited ourselves to comparing each child with those of his own age, we would not be in danger of making these assumptions which are not true. In our first illustrative case, we would say the four-year-old is fifty percentile in ability, that is, he is in the middle of his group. The twelve-year-old with a mental age of four, however, would be in the lowest one per cent of

twelve-year-olds, that is, more than 99 per cent of the group his own age would have more mental ability than he. Percentile ranks, however, do not constitute quantitatively equal units throughout the whole range of ranks. Usually a difference of one percentile at the higher or lower ranks is greater than near the fifty percentile. Thus, the actual difference in ability between the 96th and 97th percentiles is probably much greater than that between the 49th and 50th, or 52d and 53d. For making illuminating appraisals of a child's ability the percentile rank has much value.

Units of Measurement. A full discussion of the units of measurement used in appraising intelligence would carry us far beyond the scope of the present volume. We must content ourselves with a brief, simple discussion which seems necessary in order that we may understand some of the problems of growth of intelligence during childhood.

Some tests use as the unit merely the number of items correct or the number of tasks or exercises correctly performed. Thus, in the substitution or cancellation tests, the score is merely the number of substitutions made or of letters crossed out. In memory tests, some words are easier, some more difficult; in other mental tests we find arithmetic problems, and diverse types of test items ranging from easy to hard; and yet the unit of measurement may be one word on the memory test, one problem in arithmetic, or one item on the other kind of test. Solving any six problems or remembering any six words gives a score of six on the test. This is not an accurate way of measuring. When all tasks are of approximately equal difficulty the inaccuracy is greatly reduced, but the test then measures speed or area of intellect, rather than altitude which is more important.

On the 1937 Stanford-Binet the unit of measurement is six months of mental age up to the fifth year. After that it is a full year, as on other age scales. Obviously, the units are not equal at various levels of intelligence unless the amount of mental growth from year to year is constant. If children grow more in intelligence from four to five years than from ten to

eleven years, we would not know it from the age scale. It would merely show an increase of one year from mental age four to mental age five, and also one year from mental age ten to mental age eleven; but it would not tell us whether one year of mental growth at four was greater than, equal to, or less than one year of mental growth at ten. Accordingly, drawing a curve through the mental age points corresponding to successive chronological ages does not give a mental growth curve in any strict sense of the term, as we have shown elsewhere.¹¹

The units of measurement in tests which have been "scaled"¹² vary according to the method of scaling. In such tests usually the relative difficulties of test items have been taken into account. At the present time considerable disagreement exists as to the best methods of securing truly equal units of measurement in mental tests.

Absolute Zero. The determination of the point at which the child may be said to have "no intelligence at all" is an exceedingly important problem and not an easy one to solve. Thurstone¹³ has suggested a method of locating the zero of mental ability from test scores of some age group. By his definition, the zero of intelligence test ability is the point at which variability vanishes, because all children will be alike only when all are at zero. Applying his method, he locates it at the time of birth or during the fetal period. The zero point is important in drawing growth curves and in scaling tests.

¹¹ See Brooks, *Psychology of Adolescence*, note under Figures 53 (p. 111), and 54 (p. 113); also in *Review of Educational Research*, vol. 3, no. 2, April, 1933, p. 114. In the latter discussion reference is made to the work of others on this point.

¹² See Arthur, *A Point Scale of Performance Tests*; Goodenough, Foster, and Van Wagenen, *The Minnesota Preschool Tests*; Stutsman, *Mental Measurement of Preschool Children*, Thorndike et al., *The Measurement of Intelligence*; Thurstone, in *Journal of Educational Psychology*, vol. 16, pp. 433-451.

¹³ See *Psychological Review*, vol. 35, pp. 175-197.

3. THE GROWTH OF INTELLIGENCE SHOWN BY THE TESTS USED AT SUCCESSIVE AGE LEVELS

We can gain considerable insight into the child's growth in intelligence by a study of the test elements used at various ages on several standardized scales for measuring general intelligence

Mental Growth as Indicated by the Kuhlmann-Binet and Stanford-Binet Tests. The two most widely used individual mental tests are the revisions made after the principles of Binet by Kuhlmann and by Terman.¹⁴ In each of these scales, the age-placement of items is determined experimentally. In general, a task is assigned to a given age level if from 60 to 75 per cent of the children of that age can perform it successfully. The Kuhlmann revision extends from the age of three months to the adult level. Each of the two forms of the 1937 revision of the Stanford-Binet has tests from the two-year level to the average adult and superior adult levels.

In order to indicate the growth of intelligent behavior year by year, tests have been selected from the Kuhlmann, the first Stanford-Binet, and the 1937 Stanford-Binet scales, beginning at the lowest age levels and continuing through the twelve-year tests. The directions for the administration and scoring of the tests have not been included. They are essential for the practical use of the scales and may be obtained from the references cited. The items used at the earliest levels are very simple as compared to the more abstract and symbolic tasks that are included in the tests above the age of six. A serious question may well be raised whether these earlier items measure the same kind of development as do the tests employed at the higher levels of the scales.

Three months.

1. If we place a small object in the child's right hand, normally he has motor coordination sufficient to carry his hand to his mouth at will, and not by random movements.

¹⁴ Kuhlmann, *A Handbook of Mental Tests*, especially chap. 4; Terman, *The Measurement of Intelligence*, chaps. 9-17; Terman and Merrill, *Measuring Intelligence*, and *The Stanford Revision and Extension of the Binet-Simon Scale for Measuring Intelligence*.

2. Normally the child reacts to some specified sudden sound by a noticeable start or wink.

3. He also turns the eyes toward a bright object which is brought within the marginal field of vision.

4. He winks at an object brought suddenly toward his eyes.

Six months.

1. He can balance his head when held in various positions, and can sit up indefinitely if supported at the back by a pillow, or for five to ten seconds without support.

2. He turns his head toward the source of sound — a sharp noise first to one side of his head and then to the other.

3. In grasping a small object, he holds it with both the thumb and fingers, or he presses the thumb against the forefinger.

4. He reaches for a bright object which he sees dangling within his reach.

Twelve months.

1. He sits unsupported for two or three minutes, and stands unsupported for five seconds or more.

2. He vocalizes, combining two or three syllables, or tries, with some success, to repeat syllables or words spoken to him.

3. He imitates simple movements like shaking a rattle or small hand bell.

4. He recognizes objects by showing preferences, and recognizes several persons.

Eighteen months.

1. He drinks from a glass of water or milk, not merely sucking.

2. He is somewhat successful in feeding himself with spoon or fork placed in his right hand.

3. He can repeat words spoken to him, such as mama, papa, baby, yes, no, cat, man, and can understand a simple question given without gesture.

4. He spits out some sour-tasting solid food.

Two years.

1. He places three small blocks (circle, square, and triangle) in holes in a 5" × 8" form board.

2. He imitates movements like raising both hands above the head, clapping hands, or putting palms of hands on top of head, etc.

3. He obeys simple commands, by attempting to get a ball throw it, put it on the table, etc.

4. He identifies by name four of six small objects attached to a card, such as toy cat, button, thimble, cup, engine, spoon.

Three years.

1. He copies a circle.
2. He names five of such common objects as shoe, watch, telephone, flag, jack-knife, stove, which are shown him.
3. He repeats three digits, such as 7-4-9, which are spoken to him slowly.
4. He builds a bridge of three blocks by placing one of them on top of the other two which must not touch each other, after observing the Examiner build such a bridge.
5. He draws a vertical line like one drawn by the Examiner.

Four years.

1. He repeats correctly a sentence of twelve syllables which is spoken slowly to him, such as "Jack likes to feed the little puppies in the barn."
2. He can select the longer of two lines which are printed on a test card.
3. He can discriminate 8 of 10 forms by selecting a square, circle, etc., when asked to find one like the one pointed to on a card.
4. He names sixteen of eighteen common objects pictured on 2" x 4" cards.
5. He has the number concept *two*, as tested with blocks and beads.

Five years.

1. He can count four blocks, four square beads, and four pennies.²⁵ (Two of three.)
2. He makes a triangle from a six-inch square of paper by folding it twice, as demonstrated by the Examiner.
3. He answers correctly the questions, "What do we do with our eyes?" and "What do we do with our ears?"
4. He defines fork, table, chair, and other common objects according to use. On the 1937 Stanford-Binet, he defines ball, hat, and stove.
5. He copies a square from one printed on paper.

Six years.

1. He traces with a pencil two of three simple mazes,

²⁵ Counting four pennies is at the five-year level on the Kuhlmann.

2. He distinguishes between forenoon and afternoon. On the 1937 Stanford-Binet, he tells the difference between bird and dog, wood and glass, slipper and boat.

3. He finds the parts missing in mutilated pictures of wagon, shoe, teapot, rabbit, glove. (Four of five.)

4. He taps four blocks in an irregular order; e.g. the Examiner taps the blocks arranged in a row in the order 1 — 4 — 2 — 3, and the child in turn does likewise.

5. He picks out three, nine, five, and seven blocks from a pile of twelve blocks, as directed by the Examiner.

Seven years.

1. He detects absurdities in pictures shown him. (Three of four.)

2. He tells the number of fingers on each hand and on both hands.

3. He repeats five digits which have been spoken slowly to him, such as 3-1-8-5-9.

4. He tells the way in which wood and coal are alike, an apple and a peach, iron and silver, a ship and an automobile. (Two of four.)

5. He copies a diamond.

Eight years.

1. He defines eight words, such as orange, envelope, straw, puddle, tap, gown, eyelash, roar, scorch, muzzle, haste, etc., from a list of gradually increasing difficulty.

2. He gives similarities — mosquito and sparrow, window and door, bread and meat.

3. He names the days of the week.

4. He detects the absurdities in statements, such as "An old gentlemen complained that he could no longer walk around the park as he used to; he said he could now go only halfway around and back again." (Three of four.)

5. He answers correctly such questions as "What makes a sailboat move?" or "What should you do if you found on the streets of a city a three-year-old baby that was lost from its parents?" (Two of three.)

Ten years.

1. He defines eleven words from a graded list.

2. He names twenty-eight words in one minute.

3. He names twelve animals in one minute.

4. He repeats six digits which have been spoken slowly to him, as 4-7-3-8-5-9.

5. He gives two reasons why most people would rather have an automobile than a bicycle.

Twelve years.

1. He defines satisfactorily abstract words like *pity*, *curiosity*, *grief*, *surprise*. (Two of four.)

2. He defines correctly fourteen words from a list of increasing difficulty.

3. He repeats five digits backwards.

4. He writes in the missing word in such sentences as "The streams are dry there has been little rain." (Two of four.)

5. He detects absurdities in a picture shown him.

From this résumé, it may be seen that the difference between the tasks assigned to the first year and those for six years appears to be much greater than the difference between the six-year and the twelve-year performance. From the mere ability to turn the head toward a sound (six months) to the ability to define five words (six years), seems to be a much greater amount of developmental progress than from the latter stage to the ability to define *pity*, *curiosity*, etc. (twelve years). From these observations, many psychologists conclude that intellectual growth during the first six years is much greater than it is during any succeeding six years.

*Mental Growth During the First Year as Shown by the Linfert-Hierholzer Tests.*¹⁶ The Linfert-Hierholzer tests consist of two series, one for infants of one to four months, the other for those aged six months to one year. They include many simple motor and other activities and show development largely through the increased percentage of older children who can do the specified things. Thus, at the age of one month 6 per cent of the children can roll from back to side, at two months 10 per cent, at four months 58 per cent. At one month 16 per cent show *eh* in their vocalizations, at two months 36 per cent, at four months 84

¹⁶ See *A Scale for Measuring the Mental Development of Infants During the First Year of Life*, pp. 20-21. The tests above six months are based on Gesell's work described in *The Mental Growth of the Pre-School Child*.

per cent. At six months 19 per cent creep, at nine months 71 per cent, at twelve months 88 per cent. At six months none says "bye-bye," at nine months 20 per cent say it, at twelve months 56 per cent. We see also in these samples some increase in difficulty or complexity of the tasks which are placed at the later months of the first year.

Growth Shown by the Merrill-Palmer Scale. Stutsman²⁷ reports the per cent of successes at age levels from 18 to 72 months on each of ninety-three test elements. We may see something of the child's development by examining two of these tests. The "action-agent" test requires the correct responses to several questions, such as "Do you know what sleeps?" "Do you know what scratches?" The verbs, *flies*, *bites*, *swims*, *burns*, *cuts*, *sails*, *melts*, *shoots*, and others, are examined similarly.

In the "little pink tower" test the child sees a small tower composed of five small cubes of different sizes. The tower is knocked down as he is watching, and he is asked to build it again, with certain specific directions.

The per cents of children succeeding on each of these two tests are as follows:

AGE GROUP (Months)	PER CENT PASSING	
	Action-Agent	Little Pink Tower, 22"
18-23	0	0
24-29	4	4
30-35	46	14
36-41	63	39
42-47	77	51
48-53	91	63
54-59	95	81
60-65	97	82
66-71	97	87

4. GROWTH CURVES OF INTELLIGENCE

Some information on the child's mental growth may be secured by plotting curves from the age norms of tests, or from

²⁷ *Mental Measurement of Preschool Children.*

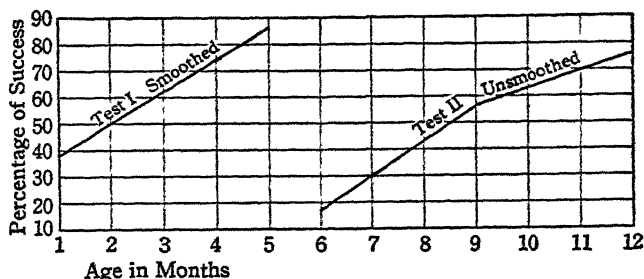


FIG. 105. AGE NORMS ON THE LINFERT-HIERHOLZER SCALE FOR MEASURING THE MENTAL DEVELOPMENT OF INFANTS DURING THE FIRST YEAR OF LIFE

the scores made on repeated tests, although such curves do not represent accurately the actual amount of intellectual development.

Mental Growth Curves During Infancy. Curves drawn from the norms of the Linfert-Hierholzer scale and from retests made by various experimenters²⁸ (see Figs. 105 to 108) seem to indicate some slowing down in growth toward the end of the period for which each particular group of tests is designed. If certain tests are suited for use during the last half of the second year, improvement may be less toward the end of this time. This may mean that the amount of improvement is greater before the later stages are reached in the development of a partic-

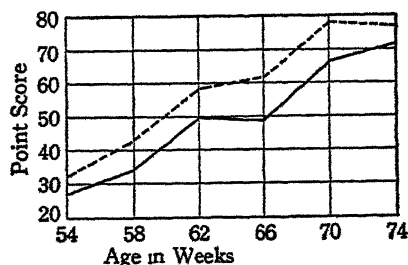


FIG. 106. DEVELOPMENT OF INFANTS, AGES FIFTY-FOUR TO SEVENTY-FOUR WEEKS
(Retests. Shirley)

²⁸ Bayley, in *Genetic Psychology Monographs*, vol. 14, pp. 1-92; Linfert and Hierholzer, *op. cit.*, pp. 20-23; Shirley, *The First Two Years*, vol. 2, part 2.

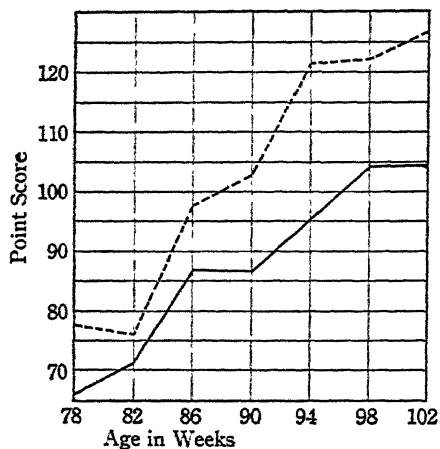


FIG. 107. DEVELOPMENT OF INFANTS, AGES SEVENTY-EIGHT TO ONE HUNDRED AND TWO WEEKS
(Retests. Shirley.)

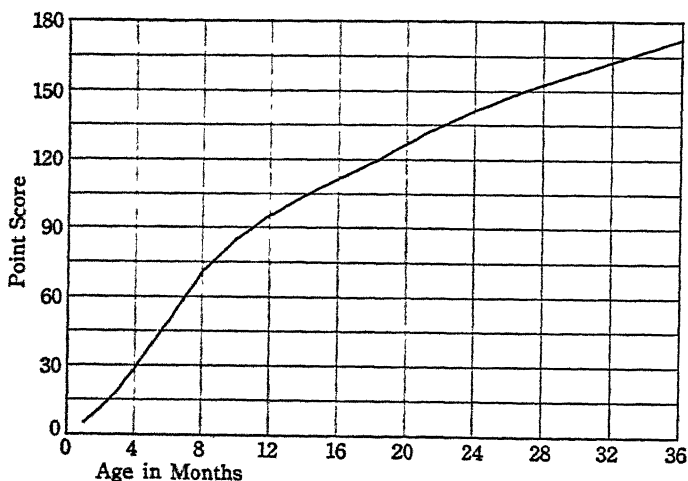


FIG. 108. MENTAL GROWTH, AGES ONE TO THIRTY-SIX MONTHS
(Point scores on repeated tests. Bayley.)

ular skill or ability. It may be also merely the result of the methods used for scaling or scoring the tests. Another possible explanation is that the results may be less reliable at the extreme age ranges for which the tests are designed, as is known to be true in the case of the first Stanford-Binet scale at the lowest and also at the highest age levels.

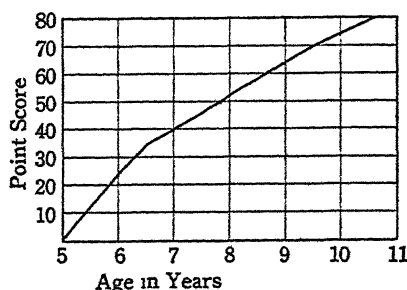


FIG. 109. NORMS ON THE DETROIT FIRST-GRADE INTELLIGENCE TESTS, AGES FIVE TO TEN

Growth Curves for Later Childhood, from Mental Test Norms. When the norms of some intelligence tests designed for use during childhood are plotted, a general tendency toward a slight negative acceleration after the sixth or seventh year is often seen. The data for the Detroit First-Grade Intelligence Test, the Dearborn Intelligence Test, Series I, and the Haggerty Delta I Test show this trend very clearly, as may be seen in Figures 109, 110, and 111. The Otis Primary Test and the

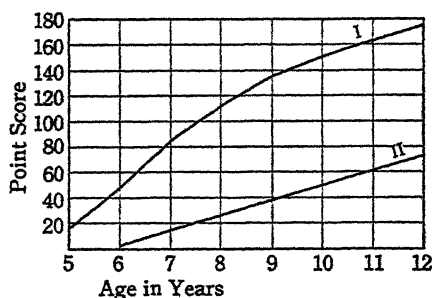


FIG. 110. NORMS ON THE DEARBORN INTELLIGENCE TESTS, SERIES I, AGES FIVE TO TWELVE

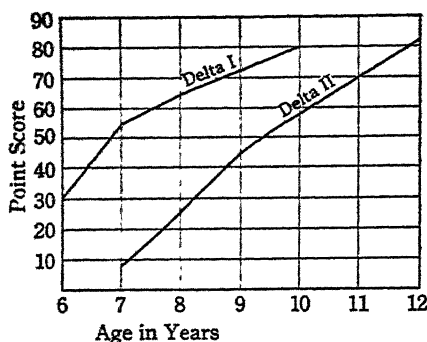


FIG. 111. GROWTH OF INTELLIGENCE SHOWN BY NORMS ON HAGGERTY TESTS, DELTA I AND II

Pintner Non-Language Test (Figs. 112 and 113), however, show the decrement at later ages (the eleventh and eighth years, respectively). The Pintner-Cunningham Primary Mental Test and the Goodenough Intelligence Test, on the contrary, display a small amount of positive acceleration in the vicinity of ages five and six, as indicated in Figures 114 and 115. These contradictory results throw great doubt on the value of test norms as a source of information on mental growth and call for an explanation.

One clue to the differences in these mental growth curves is obtained by comparing the norms of an easy or primary mental test with those for a test intended for later ages, constructed by

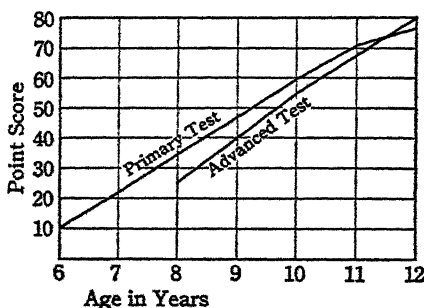


FIG. 112. GROWTH OF INTELLIGENCE SHOWN BY NORMS ON OTIS PRIMARY AND ADVANCED EXAMINATIONS

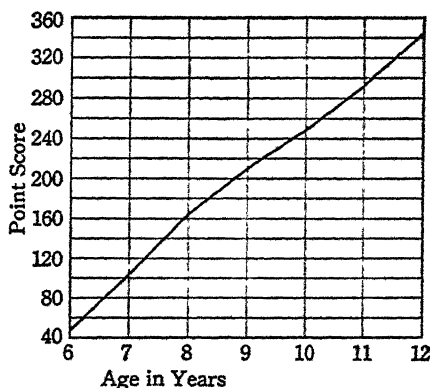


FIG. 113. NORMS ON THE PINTNER NON-LANGUAGE TESTS, AGES SIX TO TWELVE

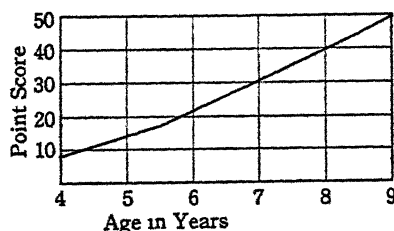


FIG. 114. GROWTH OF INTELLIGENCE, ACCORDING TO NORMS OF PINTNER-CUNNINGHAM PRIMARY TESTS

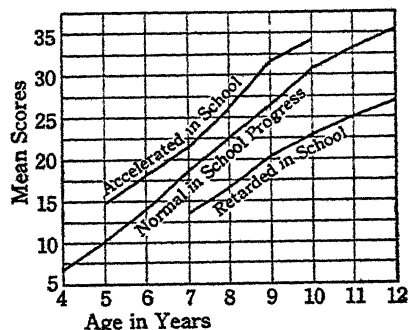


FIG. 115. MENTAL GROWTH SHOWN BY MEAN SCORES ON GOODENOUGH TESTS FOR MEASUREMENT OF INTELLIGENCE BY DRAWINGS

Age = age at last birthday. $N = 5627$.

the same author. Such data exist in the case of the Dearborn, Haggerty, and Otis tests. (Figs. 110, 111, and 112.) In each instance it may be noted that the increase in scores of the more advanced test shows no tendency to slow down after the age of six, as do the norms for the primary test. This discrepancy is probably due to two factors. One cause is the probably unfavorable selection of children on whom the later age norms of the primary tests are based. Since the more elementary examination is given chiefly in the lowest grades, the older children whose scores are reported are likely to be retarded in school and hence dull. A second reason for the variation in the curves is the different selection of items used in the primary tests. There may be an inadequate number of difficult items, resulting in an apparent decrease in scores at the upper levels which is not a genuine retardation of the rate of mental growth. These considerations show the futility of attempting to discover the course of mental growth from the crude norms of mental tests.

Growth Curves from Repeated Tests. Data obtained by testing the same children at intervals have some greater claim to validity than do data taken from different children at various ages. We have shown elsewhere,¹⁹ from our own retests of children aged nine to fifteen and from a compilation of the results of testing many children at each age from eight to eighteen, that the mental growth curve has a slight negative acceleration around the eleventh or twelfth year.

Stanford-Binet retests,²⁰ shown in Figure 116, indicate that children of ages five to twelve years increase in mental age from year to year. The mental ages of children having I.Q.'s of 110 or more increase more rapidly than do those of children whose I.Q.'s are between 90 and 110.

Curves from an Age Scale or from Gross Scores Not True Growth Curves. All of the results considered thus far in this chapter are based on gross scores, point scores, or mental ages.

¹⁹ Brooks, *The Psychology of Adolescence*, p. 96; p. 111, Fig. 53.

²⁰ Drawn from data given by Baldwin and Stecher, in *Mental Growth Curve of Normal and Superior Children*.

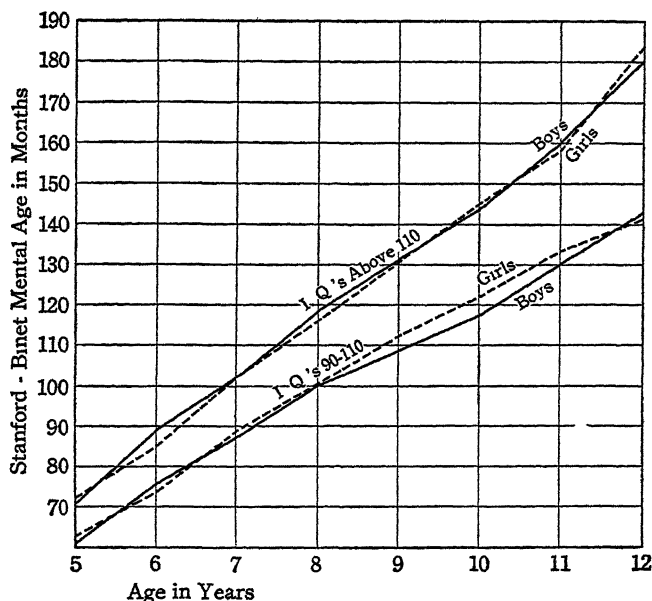


FIG. 116. STANFORD-BINET MENTAL AGES OF CHILDREN OF NORMAL AND SUPERIOR INTELLIGENCE, AT CHRONOLOGICAL AGES FIVE TO TWELVE YEARS

(Data from Baldwin and Stecher.)

To what extent may they be taken as really showing the curve of growth of intelligence? May we safely infer the rate of mental growth from them? Here we face a difficult problem. In reality, gross scores give us a rank order for pupils rather than an absolute measurement,²¹ because the sizes of units at the high, middle, and low portions of a scale are not necessarily equal. Thus on a scale whose gross scores or point scores range from 0 at the low end to 147 at the high end, an increase from a score of 5 points to 17 points is not necessarily equal to a gain from 62 to 74 points, or from 134 to 146 points. Yet in drawing curves, a point at the beginning of the scale is treated as if it were equal to one point at any other place on the scale. In plotting scores on age scales, we usually in-

²¹ See, for example, Thurstone and Ackerson, in *Journal of Educational Psychology*, vol 20, p. 569.

dicating the successive units of mental age as equal distances, that is, we have the distance from three to four years of mental age equal to that from four to five, eleven to twelve, etc. This procedure assumes that a year's mental growth of normal children from one year to the next is equal to that between any other two successive years. The curves in Figure 116 merely show the mental ages at successive chronological ages, and really show growth only in units whose magnitude is undefined.²² Age scales, however, have a great deal of practical value in child guidance and management, but they do not reveal true growth curves.

Even on the assumption of an approximate constancy of the I.Q., the mental growth curve problem is not so simple as to be solved merely by drawing a straight line (see Fig. 117) to represent normal growth, in which each successive year of chronological age is marked by an increase of one year in mental age. If the normal mental growth each year from four to

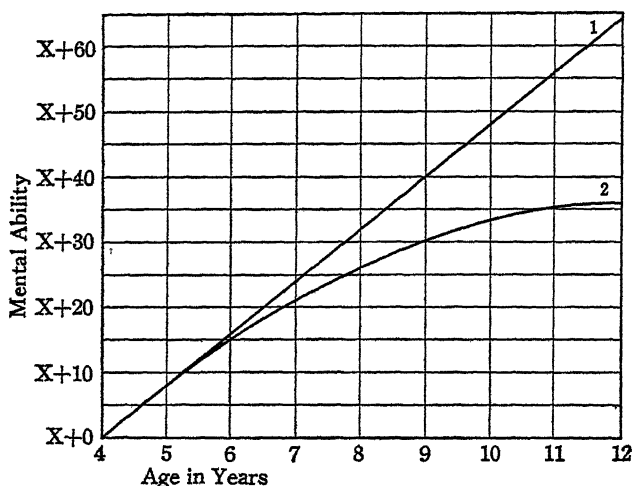


FIG. 117. THEORETICAL GROWTH CURVES OF INTELLIGENCE

1. Curve based upon assumption that a year of growth at any age equals a year of growth at any other age: that is, it is 8 points each year. 2. Growth decreases each year, being 8, 7, 6, etc., points from ages 4 to 5, 5 to 6, etc.

twelve actually was in the proportion of 8, 7, 6, 5, 4, 3, 2, 1, then the true growth curve would be the curved line of Figure 117.

Attempts to Secure True Growth Curves. Three notable attempts have been made to solve the problem of the rate of mental growth, and, strangely enough, they yield three different curves. A full discussion of the technical considerations involved in these experiments is beyond the scope of this book, so we will consider them as briefly and as simply as possible.

According to one attempt²³ "the relation between age and score was from the very beginning determined to be logarithmic."²⁴ Luh's curves for scaled values on the Chinese intelligence tests, and for similar test results on American children, are shown in Figure 118 and show negative acceleration.

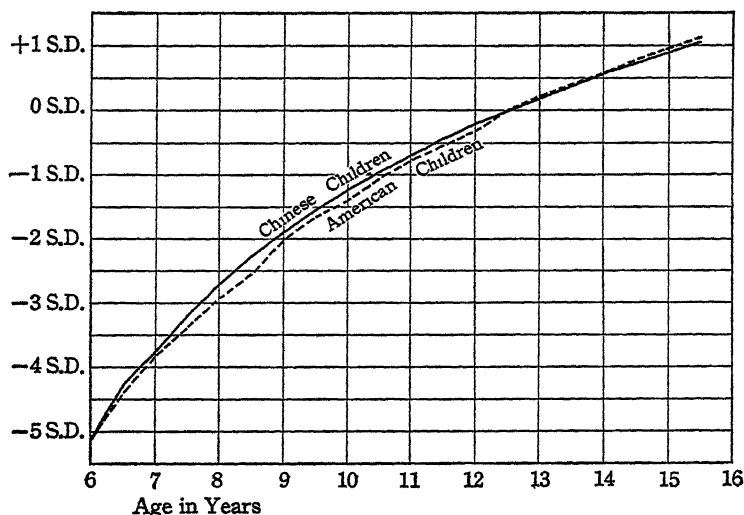


FIG. 118. LOGARITHMIC MENTAL GROWTH CURVE
(Luh.)

²³ See Luh, in *Journal of Genetic Psychology*, vol. 36, pp. 183-185.

²⁴ We have been unable to find data showing how the relation between age and score was determined. Gesell has judged the growth curve to be logarithmic upon basis of observation but not by any exact quantitative method.

Thorndike,²⁵ after applying an elaborate method of scaling tests (to secure "truly equal units") to the results of several investigations, concludes that the curve of mental growth has

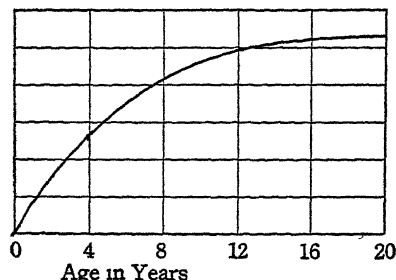


FIG. 119 ALTITUDE OF INTELLECT FROM BIRTH TO TWENTY YEARS
(Thorndike.) Showing curve judged to be parabolic.

negative acceleration, and is parabolic in shape, as shown in Figure 119.

The third attempt to solve the problem of scaling test data was made by Thurstone.²⁶ He applied his fundamental formulae for scaling to several thousand Binet scores of London and Chicago children. The curve, shown in Figure 120, resembles

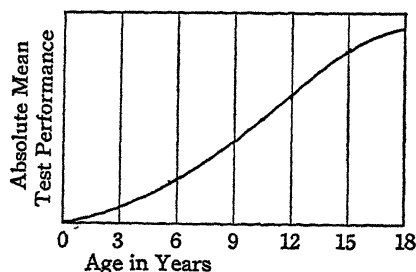


FIG. 120. MENTAL GROWTH CURVE, ABSOLUTE SCALING, 4208 STANFORD-BINET SCORES
(Thurstone and Ackerson.)

²⁵ See Thorndike *et al.*, *The Measurement of Intelligence*.

²⁶ Thurstone, in *Journal of Educational Psychology*, vol. 16, pp. 433-451; Thurstone and Ackerson, in *Journal of Educational Psychology*, vol. 20, pp. 569-583.

the ogive or cumulative percentile curve. Other applications²⁷ of this method, however, have not shown positive acceleration at the earlier ages with an inflection point around the age of eleven and negative acceleration thereafter. The study of Bayley, based on retests of very young children, showed some positive acceleration during the first nine months only. Williams, using Thurstone's method on the data of Goodenough's "drawing-a-man" test, found negative acceleration throughout the range from age five to age twelve. Only in the two curves based on the London and the Chicago Binet cases is positive acceleration found within the second six years. Obviously, the problem is not solved.

Conclusions Concerning the Rate of Mental Growth. Although it is unwise to be dogmatic about any conclusion concerning the shape of the curve of mental growth, one fact seems to be reasonably well verified. From all the sources of information that are available, it seems that mental growth during infancy and during the pre-school years is very rapid, and that the rate of development thereafter probably is slower, with negative acceleration characterizing growth during the elementary school years. Many diverse types of data support this contention. By six years of age the brain has attained 90 per cent of its adult weight. Thorndike²⁸ estimated, from his attempt to scale intellect in truly equal units from an absolute zero, that the growth from birth to the age of six and a half was from 0 to 30 units, while the average adult level was $36\frac{1}{2}$ units. The child, therefore, according to this estimate, reaches 82 per cent of his final altitude of intellect by six and a half years of age.

Whether the exact shape of the mental growth curve is logarithmic, parabolic, or an ogive is not definitely known. These differences, while important in the mathematical study of growth, are, however, not of surpassing significance in dealing with the practical problems of childhood.

²⁷ See Odom, in *Journal of Educational Psychology*, vol. 20, pp. 401-416; Williams, in *Journal of Applied Psychology*, vol. 14, pp. 239-256; Bayley, in *Genetic Psychology Monographs*, vol. 14, pp. 1-92.

²⁸ *Op. cit.*, p. 463.

5. CONSISTENCY OF PERFORMANCE ON MENTAL TESTS OR THE CONSTANCY OF THE INTELLIGENCE QUOTIENT ²⁹

Consistency in development is an important problem in child psychology, because the degree of accuracy with which development or behavior can be predicted is partly dependent upon it.

The Constancy of the I.Q. The constancy of a child's I.Q. refers to the closeness of agreement of his I.Q.'s on tests repeated after an interval of time (e.g. a year or more). Since experimental errors of various kinds enter into the administration of mental tests, the best that can be hoped for the I.Q. is relative constancy, that is, that its changes over a period of years are small, insignificant, and not in a uniform direction. The usual measure of the constancy of the I.Q. is the difference between successive measures, which might be termed the *inconstancy*. If a child is tested at the age of five and again at six, the difference between the I.Q.'s computed from the two testings tells how constant this measure is.

Constancy of the Developmental Quotient of Infants and Pre-School Children. In repeated tests of the mental development of very young children, the developmental quotients are likely to show more change than with older children. During the first year, when development is so rapid and so many new activities are appearing, the child's position in a group is likely to shift in a short period of time. Shirley's ³⁰ results show developmental scores were very inconsistent during the first year or year and a half if several weeks intervened between tests, indicating that the rate of development is not constant for different infants from birth to eighteen months. After this time

²⁹ See Bayley, in *Psychological Bulletin*, vol. 28, pp. 225-226; Furfey and Muehlenbein, in *Journal of Genetic Psychology*, vol. 40, pp. 219-223; Hallowell, in *Journal of Genetic Psychology*, vol. 40, pp. 406-421; Hirsch, in *Genetic Psychology Monographs*, vol. 7, pp. 487-546; Shirley, *The First Two Years*, vol. 2. For a good review of the literature to 1926, see Foran, in *Educational Research Bulletin*, vol. 1, no. 10, Catholic University of America; for a supplementary review to 1929, see *ibid.*, vol. 4, no. 9.

the rate of development seems to be more regular and fewer shifts in ranks take place.

In another study³¹ children from three months to forty-seven months of age were tested with a wide variety of tests and retested one or more times after intervals ranging from six months to seven years. The developmental quotients changed less than 5 points in approximately 50 per cent of the cases, from 5 to 9 points in more than a fourth of the cases, from 10 to 19 points in a sixth, and more than 20 points in only 2.3 per cent of the cases. The children who were less than one year old at the first examination were almost as stable or consistent as those who were older. In fact, they were as consistent as those twelve months to thirty-five months of age. Those three to four years old showed considerably greater stability than the younger ones. Approximately two-thirds of the changes in developmental quotients were increases.

A number of studies have investigated the effect of nursery-school training on the I.Q.'s of young children. Since some of these researches found a positive influence, and others found none, the issue is still uncertain.³²

Constancy of the I.Q. of Elementary School Children. The intelligence quotients of children aged six to twelve tend to remain constant. Under normal conditions, the I.Q. on a second test differs from that on the first examination by only a few points. In about half of the cases the difference is likely to be four or five points. A difference of more than ten points is common in only 10 to 15 per cent of the cases.

The Significance of the Difference Between Younger and Older Children in Consistency of Development. We are not sure why younger children seem to show less consistency in mental de-

³¹ See Hallowell, *op. cit.*, pp. 410-411.

³² Hildreth (*The Resemblance of Siblings in Intelligence and Achievement*) and Goodenough (*Twenty-Seventh Yearbook*, part 1, pp. 361-369) found little effect of nursery-school training upon mental growth; Barrett and Koch (*Journal of Genetic Psychology*, vol. 37, pp. 102-122) and Wellman (*Journal of Experimental Education*, vol. 1, pp. 48-69, and *Journal of Genetic Psychology*, vol. 41, pp. 116-126) found evidence that it did increase the I.Q. Goodenough's study included only 28 cases; Wellman used 600 cases. The differences in their findings may be caused in part by differences in nursery-school experiences of the children or by the difference in the size of nursery-school populations used.

velopment than do older children. It may be because the tests used at the earlier ages are less reliable, or because standard testing conditions cannot be secured so readily. Since a fundamental assumption underlying all mental measurement is that performance bears a constant functional relation to the ability being measured (for example, that the higher the score, the more of the ability in question), testing conditions must be controlled so that emotional factors, willingness to put forth one's best effort, and the like, are more or less constant at various examinations. If shyness, timidity, stubbornness, lack of interest, or lack of effort is present more with the younger children, their I.Q.'s would tend to be less consistent upon re-testing. Whenever the results are dependent upon two or more factors combined in unknown proportions we cannot know the effect of any one of them. Accordingly, testing conditions at the earlier ages may account for the lower consistency found at that time. Also, if mental growth is much more rapid during pre-school years than thereafter, the child's greater constancy of I.Q. at the latter time may, indeed, be merely the result of the fact that the amount of growth during the school years is so small in comparison with that before the age of six that any changes in it can have but little effect upon the I.Q. This is particularly significant also because in calculating the I.Q. of a younger child we use a smaller number as the denominator and this tends toward greater fluctuations. Thus a change or error of 6 months in mental age at the age of three years means 17 points of I.Q., but at the age of eight, only 6 points. At any rate, the predictive value of developmental quotients secured during infancy and early pre-school years is less than at later ages.

6. RANGE OF INDIVIDUAL DIFFERENCES IN MENTAL TRAITS FROM BIRTH TO TWELVE YEARS

If we could draw true mental growth curves of children for the first dozen years, would they be parallel, would they di-

verge, or would they converge? Are children more alike in mental ability at birth than at the age of twelve years?

This problem has been approached in three ways. According to common observation the difference between the highly gifted child of twelve and the lowest grade feeble-minded one of the same age is much greater than the difference in mental ability between the very bright and the very stupid four-year-olds, even though one may not like to believe that the feeble-minded child is falling farther and farther below the normal or very bright. Actual comparison of the specific mental activities which children of different levels of intelligence at different ages can perform seems to show clearly enough that the older ones are less alike in intelligence than the younger ones.

We may compare the results of tests and retests at various ages and try to see if the spread of scores increases, decreases, or remains constant as age increases. Thus Baldwin and Stecher's curves in Figure 116 would seem to show an increasing range of talent as age increases. Some slight increase is suggested by the range at various ages of the middle half of the scores from which the norms of certain group tests are computed. We have already shown, however (see page 265), that curves from gross scores and mental ages are not true growth curves, and really show the relative ranks rather than the amounts of the ability in question. Accordingly, any increased spread appearing during later childhood may be due to the measuring instrument itself.

From the scientific standpoint probably the most convincing evidence comes from the attempts of Thorndike and of Thurstone³³ to scale tests so as to secure truly equal units. Although their methods differ, both conclude that the range of individual differences in intelligence increases as children get older, thus giving support to the conclusions from careful observation of the difficulty of intellectual activities actually found at earlier and later ages.

³³ Thorndike, *op. cit.*; Thurstone, *op. cit.*

7. NATURE AND NURTURE IN MENTAL GROWTH ³⁴

Which influences a child's mental development more, his environment (his surroundings, the training he has received) or his heredity? An enormous mass of material has been published on this subject, and much discussion has been carried on by the environmentalists and hereditarians. On the whole, the results of these studies are in conflict so much that a definite final conclusion cannot be reached. Most investigators believe that environment has some differential effect upon intelligence as measured by existing intelligence tests. Some attribute to it a half or more of the differences in intelligence, but the majority of investigators estimate its influence at much less. Probably we should add that even if all the studies showed environment having an important influence upon I.Q., we still would not know whether it really does speed up the tempo of mental development or merely helps the child do better on the present types of intelligence tests by giving him certain information and skills.³⁵

SELECTED REFERENCES

The literature on the growth of intelligence from birth to puberty is reviewed by Cattell, in the *Review of Educational Research*, vol. 3 (April, 1933), chap. 1, and vol. 6 (February, 1936), chap. 1; and by Meek and Jersild, vol. 6 (February, 1936), chap. 2.

Baldwin and Stecher, in *The Psychology of the Preschool Child*, chap. 3, report a number of investigations on general intelligence and learning of children from two to six years of age; Bayley, in *Genetic Psychology Monographs*, vol. 14 (1933), pp. 1-92, describes mental growth during the first three years; Gesell, in *Mental Growth of the Pre-School Child*, chaps. 10 and 32, gives normative data on many tests which are similar to those used in measuring intelligence; Sherman and Sherman, in *The Process of Human Behavior*, chap. 4, discuss the relation of sensori-motor development to the

³⁴ Probably the best introduction to this problem can be found in the *Twenty-Seventh Yearbook of the National Society for the Study of Education*, part 1, especially the chapters by Burks and Freeman; see also Gesell and Thompson, *Learning and Growth in Identical Infant Twins*; Holzinger, in *Journal of Educational Psychology*, vol. 20, pp. 241-248; Newman, in *Journal of Heredity*, vol. 20, pp. 49-64, 97-104, 153-166, and vol. 23, pp. 2-18; Sims, in *Journal of Educational Psychology*, vol. 22, pp. 56-65; and Wingfield and Sandiford, in *Journal of Educational Psychology*, vol. 19, pp. 410-423.

³⁵ See Cattell, in *Review of Educational Research*, vol. 4, p. 103.

growth of intelligence and the first signs of intelligence in infants. Dearborn, in *Intelligence Tests*, chap. 4, Pintner, in *Intelligence Testing* (revised), chap. 4, and Thorndike *et al*, in *The Measurement of Intelligence*, chap. 1, discuss the meaning and nature of intelligence; these three books, together with Terman and Merrill's *Measuring Intelligence*, Stutsman's *Mental Measurement of Preschool Children*, and Kuhlmann's *Manual of Mental Tests*, give detailed directions for measuring intelligence from three months to maturity. Additional data on the nature of intelligence are given in Spearman's *The Nature of Intelligence and the Principles of Cognition* and in Thurstone's *The Nature of Intelligence*. Woodworth, in *Psychology* (third edition), chap. 4, discusses intelligence, its measurement, and growth. Stoddard and Wellman, in *Child Psychology*, chaps. 7-9, present considerable experimental evidence on the growth of intelligence, its relationships to other factors in child development, and the meaning of intelligence. Witty, in *Educational Psychology* (edited by Skinner), chap. 16, also discusses the nature, development, and measurement of intelligence.

Additional references are found at the end of this volume.

CHAPTER X

EMOTIONAL BEHAVIOR

THE individual's emotional responses are among the most important components of his personality. From infancy to old age emotion is closely identified with happiness and misery, and hence with human welfare. Emotion is intimately related to many other phases of behavior. Motives and interests are, to a large extent, based on emotional habits, as described in Chapter XII. The normal development of emotional patterns is significant in relation to mental health, since emotional maturity is a fundamental characteristic of the well-adjusted person.

The present chapter endeavors to trace the origin and early development of emotional behavior in the infant. Some of the questions that demand answers are these: What is the general nature and significance of emotion? How are the emotions of children and infants studied? Do infants have certain specific innate emotions? What emotional development takes place during the first year of life? To what extent do maturation and learning influence emotional patterns as the child grows older?

In Chapter XI, the nature of the more specific and differentiated forms of emotional behavior is considered. The nature, development, and guidance of fears, angers, jealousies, and similar types of emotional responses offer many problems of practical importance.

I. THE NATURE OF EMOTION

The Meaning of Emotion. The term *emotion* has been employed in a number of different meanings, which must be distinguished carefully in order to avoid confusion. The older psychological view of emotion regarded it as a *conscious state*, which could be sensed and described by the person experienc-

ing it. According to this older theory, the number of different emotions was as inexhaustible as man's ability to describe various states of feeling. A large number of conditions, such as fear, anger, joy, sorrow, jealousy, anxiety, excitement, contentment, sympathy, affection, humor, disgust, delight, and happiness, were described as separate "emotions," each quite independent and native. Now it is true that these states are introspectively different to an adult and may seem quite unrelated to the naive observer. But, as is also true of many other forms of complex behavior cited throughout this book, the adult does not realize the course of development by which his "emotions" came into being. Modern psychology recognizes these emotional states not as separate and native entities, but as complex habits based on many experiences. The older hypothesis of separate "emotions" is closely allied to the hypothesis of so-called "instincts," which was considered in Chapter II, and found to be of little value. Just as the so-called instincts of man are found to be largely learned habits when critically examined, so his so-called "emotions" will be regarded most validly as emotional habits.

A second view regarded emotions as outer expressions, or (2) *overt responses*. According to this approach, the criterion of fear is the act of running away. Rage is distinguished if the individual struggles. This definition of emotion has much to recommend it, for, at least, it is based on objective and observable facts. It is, however, inapplicable to infancy as evidence cited later in this chapter shows. There is some reason to believe that the outer, muscular manifestations of emotions are also habits and are best regarded as learned rather than as native forms of behavior.

The third approach to emotion regards it as an *inner organic* (3) *state*. Since this view is the most fundamental, it is considered at length in the next sections.

Bodily Changes in Emotion. Some of the most important reactions characteristic of the emotional state cannot be observed by the casual onlooker, but are detected only by the use of experimental and instrumental techniques. Dogs, cats, and

other animals show certain quite similar patterns of behavior when aroused emotionally. Not only do they spit, snarl, bark, or make other overt responses quite easily noticed by the casual observer and commonly regarded as typical of the emotional state, but they make other responses which can be observed only by the use of suitable instruments. Among these responses are the sudden stopping of digestive movements, the forcing of blood from the trunk into the limbs, the decreased flow of saliva, and other important changes in secretions. The flow of gastric juice may decrease to only fifteen or twenty per cent of the usual amount and not return to normal for some minutes. The physiologist can observe these internal changes in man as well as in animals below man, but he cannot tell from them whether the emotional state is one of fear, anger, or intense pain. He may note that the heart beat is stronger and more rapid; that breathing is deeper and more rapid; that the tiny smooth muscles of the lungs dilate, thus making possible greater aëration of the blood; that the liver pours larger amounts of glycogen or blood-sugar into the blood stream, thus providing the muscles with an increased amount of readily usable fuel; that the skeletal muscles receive greater amounts of this richer blood and the digestive tract smaller amounts; but he cannot tell from these internal changes what the emotional state is.

The Neural Basis of Emotion. In strong emotion the inner adjustments described in the preceding paragraph are dependent upon the positive activity of the thoracico-lumbar or sympathetic subdivision of the autonomic division of the nervous system.¹ The autonomic division consists of ganglia or collections of nerve cells lying alongside the spinal column, and of certain nerves arising from the brain stem and spinal cord. It controls the action of the smooth muscles of the internal organs over which the individual has little voluntary control, whence its name. The autonomic division does not work entirely independently of the central division of the nervous sys-

¹ For a more adequate account of the autonomic division and its functions see Herick, *Introduction to Neurology*, or any standard work on Physiology or Neurology.

tem, however, but receives its initial impulses from the central division. From the spinal cord and brain stem outgoing motor fibers (axons) discharge impulses through synapses into the dendrites of the neurones of the autonomic division. From the autonomic division axons run to the various internal organs, to the stomach, intestines, heart, lungs, walls of the blood vessels, kidneys, pancreas, salivary glands, sweat glands, adrenal glands, the radial muscles (of the iris) that dilate the pupils of the eyes, the liver, and other viscera. Although the autonomic division carries on its regular functions of regulating the vital bodily processes without control by the brain, yet it may be affected by activity of the brain. Thoughts, ideas, memories, and other mental processes may modify bodily processes by innervating the autonomic division. Thus, one may think of some exciting event and find that his heart rate has increased and that his digestion is adversely affected. The autonomic division is thus a part of the general nervous system, and not a separate system as is sometimes crudely asserted.

The autonomic division consists of three subdivisions — the cranial, sympathetic (or thoracico-lumbar), and the sacral. The upper or *cranial* subdivision comprises nerves arising from the brain stem and certain ganglia. It has such important effects as slowing the heart beat, stimulating the flow of gastric juice, and stimulating the muscular wall of the stomach to make the churning movement essential to digestion. It promotes the comfortable relaxed state favorable to digestion, and controls the circular or sphincter muscle of the iris, as well as the tear glands, the salivary glands, and the blood vessels to various parts of the head. Its fibers extend to the larynx, intestines, and other small organs. The *thoracico-lumbar* or middle subdivision consists of ganglia and nerves arising from the spinal cord at the level of the chest. Its fibers go to nearly all of the internal organs, as well as to the radial muscle of the iris which dilates the pupil of the eye. It has the opposite effects upon heart and stomach to those of the cranial subdivision. The lower or *sacral* subdivision consists of nerve fibers from the lower portion of the spinal cord which extend

to the lower portion of the large intestine, the kidneys, bladder, and the artery to the external genitals.

One of the most significant facts about the autonomic division of the nervous system is the functional opposition between the middle or sympathetic subdivision and the other two. In fact, the autonomic division sometimes is regarded as having two subdivisions, the thoracico-lumbar or sympathetic and the cranio-sacral.² Most of the internal organs have a double supply of nerves, one from the cranial or sacral, and the other from the sympathetic. One set of nerves has the effect of increasing the activity of an organ, whereas the other set inhibits or decreases the organ's activity. If the thoracico-lumbar nerve fibers to the heart be cut, the cranial subdivision may push the heart rate down to 30; if, however, the cranial subdivision be cut, the thoracico-lumbar subdivision may force the heart rate up to 300. Even in strong anger or fear, the heart rate may be forced up from 70 to 150 or more beats per minute. The cranial and sacral subdivisions usually work together harmoniously, as in controlling normal digestive activities.

One exception to the general rule of each internal organ having a double supply of nerves is found in the adrenal glands. They are dominated by the middle subdivision of the autonomic, since they have nerve fibers coming only from this subdivision. Accordingly, when some strongly exciting event occurs, the middle subdivision of the autonomic stimulates the adrenal glands to pour more adrenin into the blood stream. The increased amount of adrenin in the blood stream furthers the internal changes which we have already described as characteristic in strong emotion.

✓ *Cannon's Emergency Theory of the Emotions.* The internal changes in strong emotion may be regarded as preparatory reactions which place the individual in physical condition suitable for violent physical exertion. The increased circulation of the blood, the deeper and more rapid breathing, the more abundant fuel for muscular activity, the protection from fa-

² See, for example, Warren and Carmichael, *Elements of Human Psychology*, revised edition, p. 276.

tigue, the increased readiness of the blood to clot upon exposure to the air, and the decreased digestive processes are effective preparation for greater muscular exertion or struggle. From such facts as these, Cannon³ formulated his well-known emergency theory of the emotions, according to which the autonomic division of the nervous system is regarded as a well-coordinated, check-and-drive mechanism stimulated by events requiring immediate, strong, and possibly long-continued physical activity. Under conditions of primitive life such an arrangement may have had considerable adaptive value, especially in the organism's self-preservation, but under the conditions of modern civilized life its value probably is very small indeed. In many cases the disrupting effect of strong excitement may be actually harmful.

Emotion or Emotions? The physiological point of view discourages the tendency to compile long lists of separate "emotions." A bodily basis is found for only one excited and disorganizing emotional condition, that which is coordinated by the sympathetic subdivision of the autonomic division. This is the basis for such states as fear, anger, excitement, jealousy, and disgust. In their more complex conscious and muscular components, these are different. In their manifestation in the body, they are alike.

The cranio-sacral impulses of the autonomic division organize a state of quiet well-being. This may be regarded as a condition of non-emotion, or possibly as a second antagonistic emotion, basic to the reactions designated as contentment, love, enjoyment, and satisfaction, later in life.⁴

2. HOW CHILDREN'S EMOTIONS ARE STUDIED

Evidences of Emotions in Infants. Nearly everyone believes that the human infant displays emotional behavior, and this undoubtedly is correct. Many persons, however, are prone to read into the infant's behavior the adult's interpretation or

³ *Bodily Changes in Pain, Hunger, Fear and Rage.*

⁴ See Shaffer, *The Psychology of Adjustment*, pp 40-53.

point of view. They assume that infant responses have the same meaning for the infant as they have for the adult. Accordingly, we should ask ourselves, "How do we know the infant has any emotion?" Obviously, we cannot use verbal methods nor can we secure subjective reports of the conscious elements of any emotional experience. Three techniques may be used with young infants.

(1) We may observe and record his overt movements as indicators of emotion. Various sensory or perceptual stimuli may be presented and the infant's responses noted. Thus, as a suitable toy is offered to him a sudden loud noise occurs. Changes in his behavior are observed which may be regarded as the overt expression of emotion, such as "startle," crying, vigorous movement, or holding the breath. This method has been used extensively, but is subject to some difficulties and inaccuracies, as will be seen presently.

(2) Internal physiological changes in infants may be observed as indicators of emotional tension. For example, altered pulse rate, blood pressure, or breathing may be observed. Considerable evidence from studies of older individuals indicates that the inspiration-expiration ratio increases during strong emotion. In normal breathing the ratio of time taken for inhaling to time taken for exhaling (including the quiet period which precedes the next inhalation) is about 1 to 4; but in some strong emotion the ratio may be as much as 1 to 2 or even 1 to 1. Although much remains to be done in investigating changes in breathing as evidences of emotion in very young children, this is a very promising method for research.

(3) Changes in the electrical resistance of the skin occur during strong emotion with considerable uniformity. In general, the resistance decreases when emotion is displayed. This phenomenon, known as the galvanic skin reflex or psychogalvanic reflex is studied by using certain electrical measuring instruments, usually the Wheatstone bridge and galvanometer. Since it is entirely objective, it is suitable for use with infants, and has been the basis of considerable recent research.⁵

⁵ See, for example, Jones, in *Child Development*, vol. 1, pp. 106-110.

Difficulties in Judging Emotions from the Infant's Overt Behavior. Judging an infant's emotions from his overt behavior is not as simple or reliable as it seems. For example, if several observers know the character of the stimulus which is applied to the infant they are likely to agree in their judgments of what emotions his overt responses signify. If, however, they do not know the stimuli applied, they are likely to disagree very much in their estimates of the emotions being expressed. Excellent experimental evidence supports the two foregoing statements. Sherman⁶ conducted three investigations to ascertain the ability of adults to differentiate the emotional responses of infants (a) from motion picture views, (b) from actual observation, and (c) from hearing the cries of infants.

In the first study infants less than twelve days old were observed under four different kinds of stimuli: hunger induced by delaying feeding thirty minutes beyond the regular time; restraint of bodily movements; pain resulting from pricking with a needle; and dropping the infant two or three feet upon a soft bed. Motion pictures were taken of the infants' responses and were shown to a group of adults consisting of nurses, medical students, and students of psychology. First, only the responses were shown. The adults who tried to judge what emotions the infants were expressing did not know what stimulus brought about any particular response. Nor did they agree in their judgments of what emotions the infants were experiencing. Thus, crying in the case of hunger was thought to be anger by thirteen observers, fear by seven observers, hunger by seven, pain by three and grief and consternation by one each. Dropping (loss of support) which, according to Watson and others, is supposed to elicit fear responses, led to behavior which was regarded as anger by fifteen of these observers, as fear by five of them, as hunger by six, as pain by three, and as grief, consternation, and nausea by one each. These adult observers' judgments agreed but little better than chance. In another series of trials, pictures of the stimulus and response

⁶ *Journal of Comparative Psychology*, vol. 7, pp. 265-284, 335-351; or Sherman and Sherman, *The Process of Human Behavior*, chap. 5.

were shown in correct order. This time the observers' judgments followed the conventional classifications which they had learned in their readings on emotions. They named the emotions according to the stimulus rather than according to the response. Another group of adults were shown motion pictures of a number of emotional reactions of infants and were informed that they would see four kinds of response — hunger, fear, anger, and pain. Again, they did no better than those who had seen motion pictures of the responses but not of the stimuli: — 10 per cent named the hunger responses correctly; 40 per cent called it pain; 26 per cent, anger; and 15 per cent, fear.

In the second investigation adults observed the responses of infants but did not see or know the kind of stimulus used. Here, too, their judgments were little better than guesses. In the third case the observers heard only the vocal responses of the infants, and again, their judgments were no better than guessing.⁷ Thus we see that adults cannot discriminate the so-called emotions of infants by observing their overt responses. Part of this difficulty undoubtedly lies in the fact that the infant's earliest emotional responses are undifferentiated or generalized rather than specific, as is shown in section 3 of this chapter.

Studying the Emotions of Pre-School Children. By the time the child is a year old his emotional behavior patterns seem to be well enough differentiated for adults to recognize them with considerably more accuracy than in the case of newborn infants.⁸ Accordingly, observation of the young child's overt responses may give some clues of his emotional states. With the development of language, the child's verbal reactions furnish additional evidence for judging his emotions. Of course, the internal physiological changes and the psychogalvanic reflex may be used to determine the presence of strong emotional tensions.

How to Study the Emotions of School Children. The three

⁷ Cf. also Goodenough, in *Journal of Juvenile Research*, vol. 13, pp. 204-219.

⁸ See Goodenough, *op. cit.*

techniques available for studying the emotions of very young children may be used with school children and adults. In addition to them, two other techniques may be used to advantage with school children, the "free association" test and subjective report by the child himself. Briefly stated, the "free association" test consists of a list of words which is read to the subject who gives in each case the first word that comes to mind. Emotionally toned stimulus words — those related to some emotional tension — cause confusion, blushing, increased reaction time, or other evidences of emotional disturbance. This technique seems to be better adapted for use with older children and adults, especially in studying the emotions of abnormal rather than normal persons. In such cases this technique has been of value in revealing specific emotional problems and in making clear the origins of the subject's troubles.

Subjective reports of emotional tensions by children themselves usually are secured by the use of various questionnaires, adjustment inventories, or emotional stability tests. Some of these may be used with older children. The Woodworth emotional stability questionnaire or personal data sheet (revised by Mathews) consists of seventy-five questions relating to certain complaints and unfavorable reactions, some of them having particular significance in revealing emotional behavior. It can be given as a group test. Some of the questions are given to show the nature of the questionnaire.⁹

- | | | |
|---|-----|----|
| 1. Do you like to play better by yourself than with other children? | Yes | No |
| 10. Are you afraid during a thunderstorm? | Yes | No |
| 12. Are you afraid of the dark? | Yes | No |
| 28. Are you usually happy? | Yes | No |
| 31. Do you ever wish you were dead? | Yes | No |
| 52. Does your family treat you right? | Yes | No |
| 57. Does it make you uneasy to cross a wide street or open square? | Yes | No |

The Pressey X-O ("cross-out") Tests for Investigating the Emotions, Form B, is a group test which can be used with chil-

⁹ *Journal of Delinquency*, vol. 8, pp. 1-40

dren in school as far down as Grade IV. It consists of three sections of 125 words each. The directions are:

1. Cross out everything that you like or are interested in.
2. Cross out everything about which you have worried or feel nervous or anxious.
3. Cross out everything that you think is wrong.

The data secured from this test reveal emotional attitudes and give the investigator fruitful clues for further study of individuals.

3. THE BEGINNINGS OF EMOTIONAL BEHAVIOR

The Infant's Earliest Emotional Responses. Recent investigations show that the infant's earliest emotional behavior does not include any highly specific stereotyped reactions such as fear or anger, but that it consists of non-specific responses which may best be described as *excitement*. Thus, Bridges²⁰ found that certain strong stimuli agitated or excited the infant, as shown by his tensed arm and hand muscles, quickened breathing, and jerky, kicking movements. Of the infants one and two months of age, only four were startled by the loud sound, whereas six seemed not to be disturbed by it at all. At two or three months the response was sudden but rather mild general excitement. At three or four months and thereafter the infants gave a sort of jump and looked in the direction of the sound. On the whole, up to the age of fifteen months the infants showed chiefly these general responses of excitement, rather than any specific emotions. Bridges holds that out of this vague, undifferentiated emotional response the other emotions develop. At the age of one month she found evidences that the child showed distress when disturbed, but remained merely passive and quiescent under agreeable stimulation. By the age of three months, however, he showed signs of a positive reaction of de-

²⁰ In *Child Development*, vol. 3, pp. 324-341. The stimuli used were bright sun shining directly in the infant's eyes, sudden picking up and putting down on the bed, pulling his arm through his dress sleeve, holding his arms against his sides, rapping his knuckles, pressing the bottle nipple into his mouth, and the noise of a small tin basin thrown onto a metal table from which it fell to the radiator and floor.

light. With increasing age, the type of response made to various definite stimulations seemed to take on a greater degree of specificity.

The primitive and undifferentiated pattern of emotional response typical of infancy may be regarded as an excessively strong reaction, including both the muscular and visceral systems, which is made to stimuli that are overintense or annoying. In general, stimuli for emotion are those to which the infant cannot adjust easily. The resulting emotional responses may be particularly vigorous "attempts to adjust with his body as a whole to some stimulating condition" as Sherman has suggested. From this emotional mass reaction are evolved the particular forms of emotion, as described later in the chapter.

Are There Any "Primary" Emotions? The account given in the preceding paragraphs is at considerable variance with a theory of emotion that has been widely accepted by objective psychologists from about 1920 nearly up to the present. John B. Watson, in his pioneer experiments on the emotional responses of infants, believed that he distinguished three primary emotional patterns.¹¹ These he termed fear, rage, and love or sex. Fear, according to Watson, was elicited natively by loud noises or by loss of support, resulting in a response of crying, moving the limbs and, later, by withdrawing or avoidance reactions. Rage, which was evoked only by restraint of movement, resulted in crying, gasping, and struggling. The "love" reaction was of rather different nature, consisting of smiling, mild vocalizations and reaching, in response to stroking and fondling. No one doubts that Watson made important contributions to the study of emotion by introducing objective methods and by examining the responses of young infants. Subsequent research, however, has failed to verify some of his conclusions.

A number of experimenters have determined that the stimuli used by Watson do not always cause emotional responses.¹²

¹¹ *Psychology from the Standpoint of a Behaviorist*, pp. 214-228.

¹² See, for example, Bridges, in *Child Development*, vol. 3, pp. 324-341; Irwin, in *Child Development*, vol. 3, pp. 167-169, and in *Genetic Psychology Monographs*, vol. 8, pp. 1-92; Jones, in *Pedagogical Seminary*, vol. 33, pp. 537-585; Pratt, Nelson, and Sun, *The Behavior of the Newborn Infant*; and Sherman, *The Process of Human Behavior*, or in *Journal of Comparative Psychology*, vol. 7, pp. 265-284, 335-351, 385-394.

In addition to the work of Bridges to which reference was made in the preceding topic, the following results should be mentioned. Irwin dropped 24 infants who were less than one month old for a distance of two feet, while they were lying down. In 12 per cent of the trials no overt response was observed; in 88 per cent of them some movement was noted; 46 per cent of these movements were those of the arms alone, 3 per cent were those of the legs alone, and 51 per cent were of arms and legs together. Jones,¹³ using Watson's method, found that loud sounds did not always evoke fear. Irwin, also, did not find that crying ever accompanied the presentation of loud tones to the twelve infants he studied. Sixty-six infants, ranging in age from less than one day to twenty-one days, were tested by holding their arms against their sides to see if anger responses would follow.¹⁴ This was the stimulus which Watson believed would evoke anger. In 58 per cent of the cases the infants' arms remained in the position into which the experimenter put them; in 28 per cent of the cases the stimulations had a quieting effect or elicited a brief period of activity followed by quiet; in 13 per cent the arms flexed again or other signs of activity were noted; in 3 per cent of the cases a brief period of quiet was followed by one of activity. These data indicate that the stimuli described by Watson cannot be depended upon to evoke emotional responses.

Another criticism of Watson's conclusions comes from Sherman's experiments on the identification of infants' emotional responses by adult observers, already described. If no one can detect overt differences between fear behavior and rage behavior reliably, we may reasonably doubt if these responses really are distinct.

A possible explanation of Watson's error of observation has been suggested by Shaffer.¹⁵

If a child was free to move, as when the loud sound stimulus was employed, any general muscular activity was interpreted as "withdrawing movements." If the child was held, restraint be-

¹³ *Journal of Experimental Psychology*, vol. 7, pp. 382-390.

¹⁴ Pratt, Nelson, and Sun, *op. cit.*, pp. 168-182.

¹⁵ *The Psychology of Adjustment*, p. 43.

ing used as a stimulus, the *identical* patterns of muscular movement might have been interpreted as "struggling." In the latter case the infant cannot move away or make avoidance movements, simply because of the fact of the restraint. The crucial difference between fear and rage, therefore, lies not in the reaction of the organism but in the situation which it confronts.

In general, recent research and criticism do not substantiate a theory postulating three primary emotions, or any other particular number. To stimuli that are strong, sudden, and unexpected, and to which he cannot readily adjust, the infant responds with a generalized emotion which is perhaps best termed excitement. To gentle and ameliorative stimuli he responds by evidences of satisfaction. It is noteworthy that these two responses correspond to the two divisions of the autonomic system, the sympathetic and the cranio-sacral, which control visceral reactions. These undifferentiated forms of behavior apparently are the beginning of emotion, from which the later, more complex forms are evolved.

4. THE DEVELOPMENT OF EMOTIONAL PATTERNS

The Differentiation of Emotional Patterns. Even though the very young infant shows no specific emotions, it is evident to even a casual observer that older children show behavior that may properly be designated as fear, anger, jealousy, elation, and affection. The processes by which these particular patterns of emotional response develop are of great importance to those who would understand children.

Although it is now known that observers cannot distinguish separate emotions in newborn infants, further evidence shows that definite patterns can be identified in infants that are a little older. Goodenough¹⁶ found that even by the age of ten months enough differentiation has taken place so that adults can identify some specific responses with considerable accuracy.

A very comprehensive series of observations of the development of emotional responses has been made by Bridges.¹⁷

¹⁶ *Op. cit.*

¹⁷ In *Child Development*, vol. 3, pp. 324-341; and in *Journal of Genetic Psychology*, vol. 37, pp. 514-527. See also Pratt, Nelson, and Sun, *op cit.*, and Sherman, *op. cit.*

This investigator found that the first differentiation from the general pattern of emotional excitement was *distress*, which appeared during the early weeks of life. A little later a definitely pleasant excited response, designated *delight*, appeared. From the unpleasant emotion, or distress, recognizable reactions of anger, disgust, and fear were evolved by the age of six months. Other patterns of emotion became observable with increasing age. A summary of Bridges's findings, with her interpretation of the interrelationships of the emotions involved, is given in Fig. 121.

Emotional development does not stop at the age of twenty-four months, the highest level indicated on Bridges's chart. A number of persons have noted that true *grief*, as distinguished from distress, does not appear until the child is several years old. As the individual passes from infancy to the pre-school, school, and adult years, his emotional life increases in complexity. Emotional and other elements are intricately mingled in a cross-section of his total life at any moment. As a result, it is increasingly difficult for the external observer to know and differentiate his emotions by the use of methods available at present. By the time some command of language is attained the child can tell us of his emotions. And we, having had similar experiences, have some notion of what he means.

Maturation in the Development of Emotional Responses. The two chief factors in the development of the infant's emotional patterns of response are maturation and learning. In certain studies of fear, smiling, crying, and other emotional behavior maturation appears to be an important factor. Thus, children under two years of age showed no fear of a harmless snake nearly six feet long. It glided actively about an enclosure in which there were children of various ages and adults. It showed powerful, agile movements and frequently protruded its black forked tongue which was an inch in length.¹⁸ Children at the age of three and a half years, however, paid closer attention to the snake and were more cautious in approaching and touching it. Children who were older than four years of age avoided the

¹⁸ See Jones, in *Childhood Education*, vol. 5, pp. 136-143.

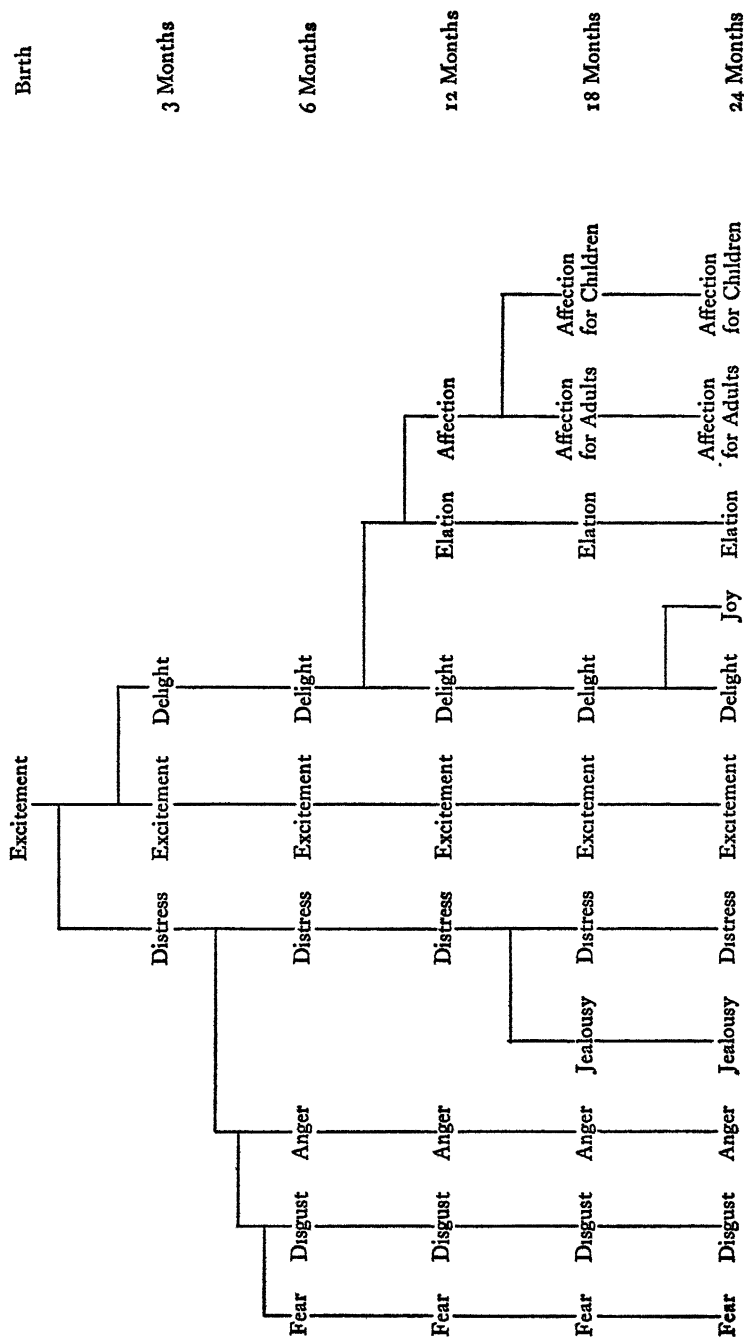


FIG. 121. THE APPROXIMATE AGES OF DIFFERENTIATION OF THE VARIOUS EMOTIONS FROM BIRTH TO TWO YEARS
(Bridges, in *Child Development*, vol. 3.)

snake more than the younger ones. Adults avoided it more than children. These results have been interpreted as follows: As the child grows older his intelligence increases and his perceptions are keener. He is startled by new or unusual things because he is better able to see that they are new or unusual. We see also in this interpretation, however, the part played by learning. The child's keener perception results in large part from experience.¹⁹

An interesting report by Goodenough²⁰ shows something of the part played by maturation in the development of emotional responses. A girl of ten who had been totally blind and deaf from birth was studied. She, of course, would learn no emotional responses from imitating others, and yet under conditions which would be expected to arouse anger, fear, or pleasure, she reacted very much according to the classic descriptions of emotional behavior. Her sensory handicaps, of course, could not prevent her from engaging in self-directed trial-and-error learning.

Gesell²¹ believes that emotional patterns during infancy are "shaped by intrinsic maturation as well as by experience." He reports that a child of ten weeks may accept confinement in a small enclosed pen with no signs of annoyance. At twenty weeks some signs of mild annoyance may be seen. At thirty weeks he may express his dissatisfaction so strongly by crying that his response may be regarded as definitely emotional.

Learning in the Development of Emotional Responses. The effect of learning on the development of emotional behavior has been investigated in a number of ways. The most widely known type of emotional learning is that of *attaching new stimuli to emotional responses*. This takes place through the mechanism of the conditioned reaction, discussed in Chapter III. A precise and carefully recorded experiment on this topic by

¹⁹ See also the studies by Bayley on crying, in *Journal of Genetic Psychology*, vol. 40, pp. 306-329, and by Washburn on smiling, in *Genetic Psychology Monographs*, vol. 6, pp. 397-537, for further evidence on the rôles of maturation and learning in emotional development

²⁰ *Journal of Abnormal and Social Psychology*, vol. 27, pp. 428-433.

²¹ In *Foundations of Experimental Psychology*, pp. 628-660.

H. E. Jones ²² is significant. A child was placed on a platform inlaid with thin brass strips which permitted the application of a mild electric stimulation of a low intensity which was described as an irritating "tickle" rather than as a painful shock. As the shock was given, an electric bell was rung. To the latter stimulus alone the child showed only mild interest which soon changed to *indifference* or *negative adaptation* (trials 5-10). Only three simultaneous stimulations by bell and current (trials 11-13) were necessary to produce conditioning. On immediately subsequent trials (14-18) the bell alone called forth the reaction originally made to the electric current — puckering of the mouth, whimpering, and shifting of the skin areas that were in contact with the metal. Further experimental work brought out several interesting phenomena, as follows: (1) *Generalization* or *irradiation* of response. On trials 19-20 an electric buzzer alone produced the conditioned response. (2) *Differentiation* or *specialization*. On trial 21 a hand bell did not produce the response originally made to the electric current, but on trials 22-24 the electric bell alone did evoke that response. (3) *Extinction*. On trials 25-26 the electric bell alone did not elicit the original response. (4) *Reinforcement*. On trials 27-32 the electric bell and current were applied simultaneously and called forth the response originally made to the electric current. The electric bell alone during trials 33-50 continued to evoke the original response. The experiment was then discontinued for twenty-four hours. (5) *Interference* from another stimulus occurred on trials 57-60 when food was presented at the same time the electric bell sounded. (6) *Extinctive inhibition* was shown on trials 63-65 when the electric bell alone failed to arouse the reaction originally shown to the electric current. Thus all the phenomena of the conditioned reaction may be seen in the operation of conditioned emotional reactions.

The conditioning of emotional responses, of course, underlies all fears, angers, and other similar manifestations, when the stimulus is not an originally sufficient one. If a child fears

²² In *Journal of Educational Psychology*, vol. 22, pp. 127-130. See also Mary Cover Jones, in *Handbook of Child Psychology* (first edition), pp. 71-93.

persons, animals, the dark, or streets, it is because he has been trained to fear them. If words (themselves harmless, mild stimuli) arouse anger, it is because these words have occurred with other stimuli that are sufficiently anger-provoking.

Another way that learning affects emotional behavior is seen in the *removing of emotional reactions*. In general this occurs through the unreinforced repetition of a stimulus, or through the inhibition of emotion by associating the stimulus with one calling forth an antagonistic reaction. If a child has learned to fear dogs, he may be cured by associating with dogs that are harmless, friendly, and playful, or by having contacts with them under reassuring or pleasant circumstances. The importance of the total stimulus situation in which an object appears is thus important in determining the response, and in determining what will be learned. M. C. Jones²³ found that children would show fear of a rat if they came upon it unexpectedly in their boxes of blocks, but not if the rat were handed to them by a familiar adult. The reason why older children and adults usually do not fear stimuli to which infants often so react, such as loud noises, is because they have learned not to make the emotional response.

A third way in which learning modifies emotional responses is by *integrating them with a pattern of learned perceptions and overt reactions*. It has been suggested that *rage* originates when the child learns to make struggling movements to certain emotion-arousing stimuli. Similarly, *fear* may perhaps be regarded as a fusion of basic emotion, plus learned avoidance movements, and a learned knowledge of the inability to cope with the stimulus. *Jealousy* cannot develop until the child has learned that other persons may interfere with his prerogatives and receive affection which he regards as his own. It is probable that all of the specific "emotions" of later life are compounds of basic emotion, knowledge, attitudes, and habits, all acquired in this manner.

The Development of Desirable or Undesirable Emotional Patterns. Every individual has to encounter a wide variety of sit-

²³ In *Journal of Experimental Psychology*, vol. 7, pp. 382-390.

uations which interfere with his plans, purposes, or desires. As the child grows, he will meet many types of frustration and thwarting. His emotional development, if properly guided, will enable him to display more and more mature patterns of response to these difficulties. He will have to suffer pain; he will meet with punishment; he will be criticized; he will be scolded; he will meet various kinds of restraints and deprivations. From his parents he will receive love, approval, and protection. To all of these different kinds of situations he will make responses, either emotional or constructive. He may learn to respond by anger outbursts, by direct attack upon the thing or person that thwarts his desires, by fear and shrinking, by too much dependence upon others, or by many other undesirable emotional patterns of response. Suitable guidance and control of the emotional development of the infant and young child are of fundamental importance for his future happiness and effectiveness. Some particular problems of emotional guidance are considered in the next chapter. Other ramifications of emotion extend to all the problems of child psychology, especially to those of personality adjustment, social development, and mental hygiene.

SELECTED REFERENCES

On the nature and meaning of emotions and their measurement, see Landis, in Boring, Langfeld, and Weld, *Psychology*, chap. 16; Dockeray, *General Psychology* (revised), chaps. 17-19; Dunlap, *Elements of Psychology*, chap. 8; Murphy, *A Briefer General Psychology*, chaps. 5 and 6; Jersild, in *Educational Psychology* (edited by Skinner), chap. 8, Woodworth, *Psychology* (third edition), chap. 13. See also Blatz and Bott, *Parents and the Pre-School Child*, chap. 7; and Sherman and Sherman, *The Process of Human Behavior*, chaps. 5 and 6 (emotions of infants and their measurement). Cannon's classical volume on *Bodily Changes in Pain, Hunger, Fear and Rage* should be mentioned. Hoskins, in *The Tides of Life*, chaps. 1, 2, gives a discussion of hormones and a good résumé of present knowledge of the adrenal glands.

On children's earliest emotional responses and the differentiation of emotional patterns, see Bridges, in *Child Development*, vol. 3 (1932), pp. 324-341; Irwin, in *Genetic Psychology Monographs*, vol. 8 (1930), pp. 1-92; Jones, in *Journal of Genetic Psychology*, vol. 33 (1926), pp. 537-585; Watson's *Psychology from the Standpoint of a Behaviorist*, pp. 214-228; Jones and Jones, in *Childhood Education*, vol. 5 (1928), pp. 136-143; and Gesell, in *Foundations of Experimental Psychology*, pp. 628-660.

CHAPTER XI

PROBLEMS OF EMOTIONAL BEHAVIOR AMONG CHILDREN

AFTER the period of infancy, commonly occurs a number of differentiated emotional responses which have been acquired through the processes of maturation and learning. Fear, anger, jealousy, joy, affection, and many other emotional patterns are characteristic of the child's life. The fact that these forms of behavior are chiefly habits, and not the innate and ultimate entities that they were once believed to be, does not diminish their practical importance.

Some of the important questions now considered are the following: What are the principal characteristics of the more common emotional patterns? What stimuli arouse them, and what responses are typical? How do they develop during the years of childhood? What can parents and teachers do to guide and control emotional behavior? What are some of the common causes of unfortunate emotional habits among children? These issues are examined in relation to each of the more important forms of emotional response.

I. ANGER

Anger More Common than Other Emotions. Anger seems to occur more frequently among children than does fear or jealousy. Apparently, many things interfere with the child's activities, and such stimuli produce anger. Fewer things evoke fear, probably because the child is protected from many fear-arousing situations by his parents and by organized society. Children are very active. Their physical activities bring them into many situations which they cannot handle adequately, hence their activities are thwarted. Or, children are restrained from doing things which the persons controlling them do not

want them to do, such as scratching furniture with a knife, or writing on the wall. Children must be trained to certain fixed personal habits and educated to respect the rights of others. All of these things at one time or another interfere with their activities or desires and may lead to anger. Accordingly, many occasions for anger do occur, resulting in frequent emotional outbursts. The child has to learn to endure many situations that seem to be thwartings from his point of view. It seems highly important for him to learn early in life how to manage adequately his emotional responses when confronted with such obstacles.

Causes of Anger in Children. A child is likely to become angry if he is thwarted or interfered with in any activity which is already in progress or about to be begun, or if he is compelled to do something which he dislikes doing. In this respect children are not unlike adults, for they, too, are prone to anger when something interferes with their plans, purposes, or activities. Many careful observations of children's anger responses have been made, so that considerable information is available on the specific causes of anger among them.

The mothers of forty-five children, whose ages ranged from seven months to seven years ten months, recorded daily observations of their children's anger responses under the direction of Goodenough¹ at the University of Minnesota. More than two-thirds of the mothers recorded observations for a month or longer, a few did so for as long as four months. The most frequent outbursts of anger occurred when the child was playing alone, when he was playing with playmates, when he was in bed, when dressing or undressing, at mealtime, and when unoccupied. The longest outbursts occurred when the child was in bed, having his bath, or going to bed. These outbursts averaged 17.9, 8.2, and 5.3 minutes in duration, respectively. The shortest anger reactions occurred when a child was playing with his playmates, when dressing or undressing, and when his teeth were being brushed or his hair combed. Their average duration was less than three minutes.

¹ See *Anger in Young Children*.

A wide variety of causal conditions for anger has been reported,² including restriction of movement; routine physical habits such as going to the toilet, going to bed, coming to meals, objecting to specific kinds of food, washing the face, bathing, combing the hair, or brushing teeth; changes in routine;³ direct conflict with authority over not being permitted to carry out some desired activity; problems of self-help such as refusal of assistance in some task when he has requested it, or refusal to do some task, or failure in his attempts to do something, or unwanted help given by the parent; a series of social-relationships problems including desire for attention, inability to make desires known, sharing possessions, and disagreements with playmates; and minor physical discomforts. The number of anger outbursts at each age and the percentage of the total number of outbursts, given in Table 13, indicate that a wide variety of causes evokes anger, and that some of them are more common or potent than others. Objection to routine physical habits ranks high at all ages from infancy to seven years. Social relationships evoke the largest number of outbursts. Direct conflict with authority is also a common cause. Restriction of movement and change in routine, on the whole, are the least common, although with the two infants under one year of age, restriction of movement ranked fourth among the causes of anger. Social relationships, routine physical habits, and physical discomfort caused more than three-fourths of the anger responses of children under one year of age. Routine physical habits, direct conflict with authority, and social relationships caused nearly three-fourths of the outbursts of children one, two, and three years of age. Nearly two-thirds of the anger responses of children four to seven years of age were evoked by these same three causes.

² See also Bridges, *The Social and Emotional Development of the Pre-School Child*, chaps. 10 and 14.

³ Shown in a few cases in which an undesirable rigid adherence to routine probably had been established through unwise training. For example, a two-year-old boy showed an outburst of anger when his father put him in his high chair at mealtime. His mother usually did so. Another outburst occurred when he discovered just before finishing his cereal that he had eaten it without the customary milk.

TABLE 13. NUMBER AND PERCENTAGE OF OUTBURSTS OF ANGER FROM VARIOUS CAUSES, IN THE CASE OF FORTY-FIVE CHILDREN,
AGES SEVEN MONTHS TO SEVEN YEARS TEN MONTHS
(From F. L. Goodenough, *Anger in Young Children*, The University of Minnesota Press)

	Under 1 Yr.		1 Yr. to 1 Yr., 11 Mos.		2 Yrs. to 2 Yrs., 11 Mos.		3 Yrs. to 3 Yrs., 11 Mos.		4 Yrs. and Over		All Ages	
	2		9		13		10		11		45	
	Outbursts		Outbursts		Outbursts		Outbursts		Outbursts		Outbursts	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Social relationships	39	27 1	84	19 7	98	19 9	212	44 2	96	28 4	529	28 1
Objection to routine physical habits	39	27 1	121	28 4	99	20 4	81	16 9	67	19 7	409	21 8
Direct conflict with authority	0	0	112	26 6	104	21 2	68	16 2	51	15 1	335	19 2
Problems of self-help	6	4 2	33	7 7	49	11 3	23	4 8	44	12 9	155	8 4
Physical discomfort or fear	33	23 0	16	3 8	29	5 8	43	9 0	15	4 5	136	7 2
Miscellaneous difficulties	8	5 6	17	4 0	17	3 5	28	5 8	24	7 8	94	5 0
Restriction of movement	9	6 3	24	5 6	18	3 7	3	0 6	7	2 1	61	3 2
Changes in routine	5	3 5	8	1 9	37	7 6	7	1 4	4	1 2	61	3 2

Children's Overt Behavior During Anger. The most common overt responses during anger vary according to the age of the child, and probably also according to training. Development leads the child to use the more socially acceptable means of getting rid of the interfering situation or condition. It also leads him to build up a wider range of approved interests and activities which can be substituted for the activity which has been thwarted. The early primitive modes of response are supplanted by less violent and more socially approved ones. During the first two or three years of the child's life holding the breath, kicking, stamping, crying, stiffening the body, throwing himself on the floor, pouting, refusing to swallow, screaming, biting, jumping up and down, grabbing, closing the mouth tightly, striking with the arms, and throwing objects are most often observed. These are soon supplemented by verbal refusals, calling names, threats, arguing, and the like. Under normal developmental conditions, the verbal responses come eventually to supplant the physical ones almost entirely.

Goodenough⁴ has shown a definite change with age in the character of the anger responses. Undirected energy was found in nearly 90 per cent of the anger responses of infants under one year of age, and in less than 40 per cent of the outbursts at four years and older (see Fig. 122). Motor and verbal resistance was found in the proportion of less than one in seven outbursts before the age of one year, but occurred three times in five at the age of four and older. Retaliative behavior was almost unobserved before the age of one year, but constituted more than a fourth of the outbursts at four years of age and older. We see here important changes in the child's anger responses. They indicate the development that is taking place as maturity and experience increase.

The frequency with which anger responses occur also changes from year to year. Goodenough's data⁵ indicate that the number of rage outbreaks is greatest during the second year of life, that is, from the age of one year up to two. Fig. 123 shows

⁴ *Op. cit.*, pp. 53-56.

⁵ *Op. cit.*, p. 71.

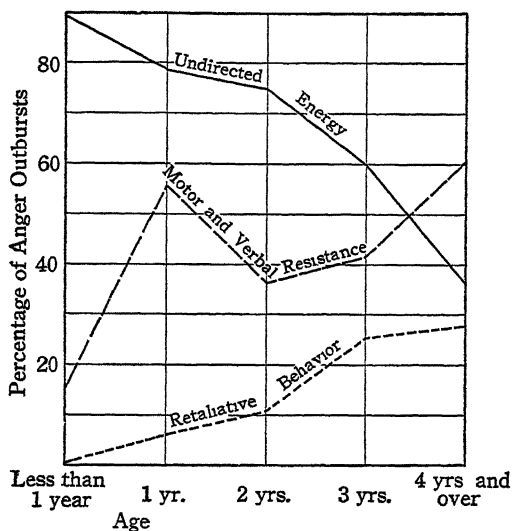


FIG. 122. TYPES OF OVERT BEHAVIOR IN ANGER OUTBURSTS OF CHILDREN RANGING IN AGE FROM SEVEN MONTHS TO SEVEN YEARS TEN MONTHS (Goodenough.)

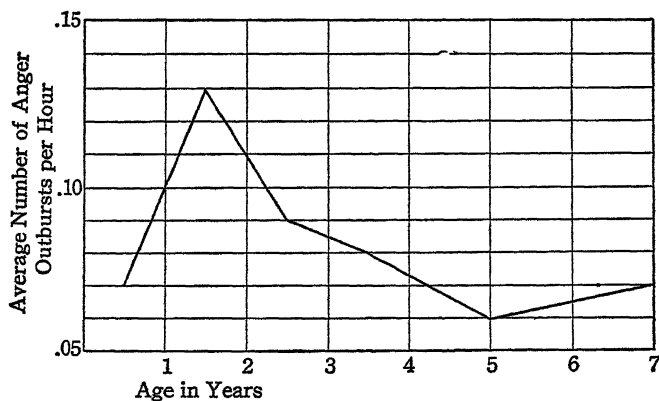


FIG. 123. AVERAGE NUMBER OF ANGER RESPONSES PER HOUR OF OBSERVATION

As reported by Goodenough. $N = 45$. Developmental trends cannot be inferred because of the small number of cases.

the result of this research. It is based on too few cases, however, to settle the problem with certainty.

Temper Tantrums. Temper tantrums are manifestations of anger in its most violent form. They seem to occur most frequently between the ages of two and three or three and a half years, but may be observed as early as fourteen or fifteen months.⁶ A wide variety of vigorous activities are characteristic. Kicking, scratching, biting the offending person, screaming, crying, and throwing himself on the floor may be observed. Often the child gets quite red in the face. Sometimes he may throw things about, strike the furniture with a toy or other object, in short, he may use any number of intense overt motor or verbal responses from his extensive repertoire. Suitable care and training, with emphasis upon substitute activities and substitute emotional responses of joy, satisfaction, or affection, seem effective in getting the child to outgrow temper tantrums. Obviously, if he frequently finds the tantrum an effective way of controlling his environment, as when it enables him to avoid some disagreeable situation, we may expect him to resort to it on many occasions. In this way the infantile emotional outburst may tend to become habitual and retard the child's emotional development.

The early emotional reactions of anger should be eliminated gradually as the child gets older and replaced by constructive problem-solving behavior in situations that thwart him. The persistence of childish emotional patterns of anger is a serious hindrance to the child's happiness, retards the development of an effective personality, and is detrimental to his social adjustments. The child's emotional development should enable him to meet most of the common situations of his daily life without many strong outbursts of anger.

2. CHILDREN'S FEARS

Causes of Fear Responses in Children. It has already been noted that fear responses in infancy are evoked by sudden and

⁶ See, for example, Bridges, in *Child Development*, vol. 3, p. 332.

unexpected strong stimulations to which the child has no ability to adjust. At the age of two years the child's fear responses are more undifferentiated and general than in the case of children three or four years old. Considerable recent observation and experimentation⁷ seem to warrant the general conclusion that fear responses are evoked in children chiefly by shock, or by such sudden or strong stimulation of any of the organs of sense as requires a sudden and new adjustment which the child is unable to make. Thus, in one investigation,⁸ many kinds of stimuli were used with pre-school children, such as false faces, darkness, slimy objects, furry animals, and mechanical toys. Many of them showed distinct signs of fear of a frog which made a sudden jump just as a child was trying to touch it. In fact, the one characteristic common to all situations evoking fear was suddenness or unexpectedness. Various conditions, however, besides the shock or unexpectedness of the stimulus are important factors in producing fear. The general setting may have certain elements which promote it. The child may not be affected by a sudden loud noise if he is at home with his father, mother, or other familiar person. He may show marked signs of fear if he is in a strange place or if he is with unfamiliar people. His response may be different if he is tired, hungry, cross, or not well, from that which it would be if he were in a different physical condition or a different mood.

Previous experience is a powerful factor in determining the character and quality of the child's emotional responses. Anticipation of pain or harm may make a situation quite potent in evoking fear which otherwise would not have this stimulus value. A child of three years and nine months had never shown any fear of the dark. One Monday, before dark, but just as twilight was coming on, she was asked to go downstairs to get some article from the dining room. All of the family

⁷ See, for example, Bridges, in *Child Development*, vol. 3, pp. 324-341, or *The Social and Emotional Development of the Pre-School Child*, chaps. 10, 14; Hagman, in *Journal of Experimental Education*, vol. 1, pp. 110-130; Jones and Jones, in *Childhood Education*, vol. 5, pp. 136-143.

⁸ See Jones and Jones, *op. cit.*

were upstairs. She said nothing, but did not go. Again she was requested to go. Still she did not do so. The third time she was told to go, and, as she did not obey, her father looked to see what was the matter, for she had never shown any stubbornness previously. Tears were streaming down her cheeks and she showed other signs of distress. Kindly questioning as to the trouble, as to why she did not go down to get the article, elicited the brief reply, "I'm afraid of the lions and tigers: it's dark down there." The father went down with her to show that there were no lions or tigers, and explained that he would not ask her to do something where she might be hurt. Still further questioning and a confirmation of certain events at Sunday School brought out the whole story. A substitute teacher on the day before had told a class of beginners of the "fierce big animals, lions, and tigers," that "came out of the awful dark woods and killed the little children that had mocked the prophet." The breathless, wide-eyed attention of the little three- and four-year-olds apparently proved a powerful stimulus to the substitute teacher, who proceeded to add some horrifying details on her own account. It required a long time to eliminate this fear of the dark. First, an explanation was made that the story referred to a long, long time ago. Second, she was told that lions and tigers and other fierce animals are not allowed to run loose in this country. Third, the child was many, many times accompanied into dark places to learn by experience not to be afraid of the dark, even playing a romping game in which she ran through a dark wardrobe to find someone. These procedures seemed to be effective, for, at least, the fear eventually disappeared. The fear was conditioned by connecting an anticipated harmful outcome with the dark. One cannot be sure in any particular instance what features of a situation will be isolated by a child and take on a fear-provoking quality. His mental set or activity at the particular time may help arouse fear. Busily engaged upon some activity, he may become aware of a situation or condition very suddenly and so become afraid.

Fears, then, may be caused by a wide variety of events.

Because of the general conditions of the child, of his surroundings, of his previous experience, and of his present stage of maturation, some stimulus may seem sudden and unexpected to him. It leaves him unprepared to do the thing which the situation seems to require. Such responses may be conditioned in terror dreams and last for some time thereafter. The most common fears found among a group of five-year-olds were connected with dogs, doctors, machines, sounds, storms, strange objects, insects, and water. The author has found children in the primary grades (ages six to nine or ten) showing fear of a very great array of objects and situations, such as blood, ghosts, death, a fainting person, dead bodies of animals, lightning, robbers, dark, being alone. Even the doctor is feared by many children at these ages. We have found some instances in which the fear of the doctor was so great that the parents had much difficulty with the child whenever it was necessary to see a doctor or to call him to attend the child. In one case, the mother of a lusty six-year-old boy always went to the neighbors to telephone for the doctor when the boy was sick, always telling him an untruth if he observed her departure and inquired about it. In situations in which pain is reasonably sure to ensue, it would seem best not to deceive the child. We have seen, in other homes, children of four, five, or six years welcome the doctor because they understood why he was coming. The child knew that if the physician hurt him, as in opening an abscessed ear, he was doing it to help him get well. We have seen children take medicine that was bitter, exceedingly so, because they had some notion of why they should take it. They had been told by the parents that it was bitter and that the parents did not like it at all either.

Many fears get tangled up with dislikes and other emotional tones so that the total response may be composed in part of fear, of anger, and of other elements.

Jersild⁹ and others have shown that younger children (ages five to six years) fear animals and criminal characters more than

⁹ See Jersild *et al*, *Children's Fears, Dreams, Wishes, Daydreams, Likes, Dislikes, Pleasant and Unpleasant Memories*.

do older children (ages eleven to twelve years), and that both groups fear about equally ghosts, corpses, skeletons, and the like.

These inventories of the things frequently feared by children of various ages have some practical value, but they often lead to a misunderstanding. It must be made clear that the children fear these situations because they have *learned* to do so. It is very certain that "native" fears of such things as animals, ghosts, the dark, or doctors do not and cannot exist.

Children's Responses to Fear Stimulations. Common overt responses in intense fear are often a sudden and temporary holding of the breath, an unusual pallor of the face, inhibited movement, and screaming in which there are no tears. Bridges¹⁰ reports that children under three years of age, when fear is not too intense, stiffen the body, inhibit movement, and cry or call for help. Older children, however, seem to show less of the helpless type of emotional response, but are more active. They jump, run away, or try to avoid the situation in some other manner. Among elementary school children, many fear-provoking situations evoke overt behavior that shows that considerable progress has been made in control. The child may be quite cautious and try to avoid unostentatiously the fear-provoking situation. If greatly frightened, he may stand still and be almost paralyzed, as in the case of a ten-year-old boy who had just seen his cousin, a girl of eight, fall into an open well. Questioned by his mother as to her whereabouts, he stared wide-eyed, tongue-tied, and pale as death. Only when his mother rushed to the well and rescued the cousin was he able to speak or move. Ordinarily, much of the response is inner turmoil, with the more marked overt activities absent. Training, however, makes a vast difference, and children with different backgrounds may respond quite differently to typical emotion-arousing situations.

Individual Differences. As would be expected, children differ in the situations which will evoke their fears and in certain features of their reactions. This is true especially as they leave

¹⁰ *The Social and Emotional Development of the Pre-School Child*, p. 189.

infancy behind and enter upon their pre-school and elementary school years. The increasingly important rôle of learning or environment appears in the differences which are found at any of the ages after infancy and early childhood. The particular situation which evokes fear in one child has no such effect upon another child of the same age and same general surroundings. Some feature of the situation has been conditioned by experience toward a fear response, or some feature resembles a previously experienced and feared situation. Thus a boy of twelve was afraid to go down a certain alley in a small town because he had seen a man there who had fainted. He had thought that the man was dead. He had even some fear of going down any alley, a clear case of irradiation or generalization of the conditioned fear reaction.

Useful and Harmful Effects of Fear. Many of the fears which beset children after the age of five have no value. They relate to imaginary events or improbable dangers. They do not aid the child in being more careful and do not lead him to any better adaptations in his daily life. So many of these fears relate to things that he will never really encounter, such as ghosts, robbers, lions, tigers, or certain kinds of poisonous snakes. All of these add needlessly to his general emotional tension. It would seem that proper training should leave the child free of all useless and probably harmful fears. Fears which make the child cautious, if we can be very sure they really do so, may have value in cases where caution really is desirable. Sometimes fear may be useful in emergencies, but, as we have already seen (Chapter X), the conditions of modern life present so many emergencies in which intelligent rather than vigorous muscular responses are needed that we can see little value for fear in the life of the child. Other emotional responses seem to be of much more value.

Handling Children's Fears. At first thought it might be concluded that the best way to prevent fears would be to keep the child away from all fear-arousing situations. The problem, however, is not so simple, for two reasons. First, it is impossible to keep the child from having contact with all fear-provok-

ing conditions. Second, it would be unwise to do so, even if we could. Life presents to everyone situations and conditions which tend to evoke fear. If this is true, then the child should not be kept from all experiences arousing fear, because he would then be poorly prepared for such problems when they inevitably arise in later life. Although the child will experience fear, there is no good reason why parents or other adults should add needless ones to his life, such as fear of the dark, of ghosts, or of being alone. Many of these are conditioned in him thoughtlessly or as a means of control. The application of intelligence and understanding to many situations tending to evoke fear, rather than the continued use of ignorance, custom, or superstition, seems highly desirable in handling children's fears. By such methods one may either prevent the child from developing fears or may help him to recondition them. We have seen a great many cases in which children's fears have been reconditioned. Even such a simple thing as becoming familiar with the fear-inspiring thing helps to eliminate the fear, especially if it is made to appear gradually rather than abruptly. If someone in whom the child has confidence is with him at first, he is likely to lose his fear more readily. We observed a child of two and a half or three years with his mother at a natural lake in a city park. The little fellow was afraid to go into the water. The mother probably should have given him a toy boat to play with and allowed him to play at the edge of the lake. He would have lost his fear gradually as he played there. Instead of this procedure, she splashed out into water a foot and a half deep, holding him by the hand, and, by her vigorous, "do or die" manner of forcing him, greatly increased his fear. She became very angry at his pulling back and scolded him severely; this intensified his emotional disturbance. He jerked loose and ran to shore. She angrily demanded that he come back. The now doubly frightened little fellow stood his ground on dry land. She went out, picked him up bodily, carried him to water up to his waist, and dropped him into it. He ran to the shore screaming and terror-stricken, and did not stop until far up the beach. Nor could she by pleading,

threatening, or scolding get hold of him. Only when they had left the beach and were near a park bench on the grass would he allow her to come close to him. Even then he was quite terror-stricken, being torn between fear of going back to the water and fear of what his angry mother might do to him.

Prevention of useless and needless fears through wise guidance and control is one effective way of handling the problem of fear. Another is reconditioning fears (*a*) by gradually familiarizing the child with the fear-inspiring thing, (*b*) by having someone in whom he has confidence with him when he first experiences it, and (*c*) by using some counter-motive, as in our illustrative case, having the child play with a boat, or a water ball, or a small bucket at the edge of the lake.¹¹

3. JEALOUSY

Early Manifestations and Causes of Jealousy. At some time during the second year of life, many children are likely to manifest behavior which can best be characterized as jealousy. Children seek the attention and affection of parents and other familiar adults. If some other child is given the desired attention, the one expecting it finds the situation thwarting. It tends to arouse anger in him. The jealous child of sixteen or eighteen months may become rigid, stand motionless, and burst into tears. If he is quite aggressive he may strike the other child, or pull his hair, or in other similar manner express his annoyance. We have seen jealous children at about two years of age try to regain the adult's attention and affection by various attention-getting devices, as by making an unusual noise with some toys, by almost falling off a kiddie car, or by unusual vocalizations. We have also seen them try to strike the adult when their attention-getting attempts failed to bring them the coveted attention and manifestations of affection. This is a species of retaliative behavior which, however, is more characteristic of older children.

¹¹ Jones (*Journal of Experimental Psychology*, vol. 7, pp 382-390) eliminated a child's fear of a rabbit by presenting it at a distance as he ate his meal, gradually bringing it nearer on successive occasions until finally he showed no fear of it.

Jealousy, obviously, is not a separate, distinct innate pattern of emotional response. It is the name applied to the responses made when one's activities, purposes, or desires are thwarted, and the resulting anger or distress is directed toward some other individual of whom one is said to be jealous.

Jealousy Among Pre-School Children. According to widespread popular belief, the classical situation for arousing jealousy in the young child is the arrival of a new baby brother or sister who now becomes the center of family attention and affection, the next older child being greatly slighted and overlooked. No doubt jealousy does arise many times in such cases but it is by no means universal. Watson¹² reports the case of a boy of two and a half who did not show any jealousy of his baby brother just home from the hospital. We have observed and have received reports on fourteen cases in which the differences in ages between the new baby and the older brother or sister ranged from two years up to six years. These children were from good homes, in which intelligent parents were exercising considerable care and judgment in training their children. The new baby occasioned no noticeable jealousy in any of these cases. Usually the baby was welcomed by the older brother or sister and was highly regarded by the older child. One girl of five years in kindergarten, when the group was discussing plans, toys, and interests, said with great joy and content, her face shining with happiness, that she had a 'little baby sister.

As the new baby matures and takes a more active place in the family circle, jealousy is more likely to arise. It does occur in many instances if we may accept the results of investigations of the jealous behavior of children. Girls seem to be more jealous than boys,¹³ although this point is not established with great certainty. Apparently, jealousy among brothers and sisters of the pre-school years is more common during the period between the ages of one and a half and four years. Some of the concrete cases of jealousy, cited by Foster, are interesting and suggestive. A little girl of two, quite fond of her mother, became jealous when her father showed affection for the mother.

¹² *Behaviorism*.

¹³ See Foster, in *Mental Hygiene*, vol. 11, pp. 53-77.

A small boy of four had shown no jealousy of his two-year-old sister. When his blanket was used to cover her, however, he became very jealous and would strike her when alone with her. The thwarting nature of the situations arousing jealousy is clearly apparent. Jealousy among pre-school children may be directed toward companions and toward other individuals as well as toward younger (or older) brothers and sisters. Let some other child secure the attention, affection, or cherished possession of a child and jealousy is a probable response. We observed a little fellow of three whose efforts at attention-getting failed when some women were calling on his mother. He rode his kiddie car noisily and recklessly through the hall and then into the living room. His mother, engaged in earnest conversation, ignored him. He lingered a bit, then struck one woman (to whom his mother was listening intently) on the knee with his fist, and ran from the room as fast as he could.

Causes of Jealousy After the Pre-School Years. The child of five or six may show jealousy of other children because of any one of a wide variety of situations. As he grows older and his range of activities and experiences increases, the causes of jealousy become more numerous. Competitions over prestige in games, achievement in school, the friendship of others, honors and recognitions of many sorts, family reputation, his own standing, and other similar situations commonly are found underlying the jealousies of these years. Often the individual develops a "dog-in-the-manger" attitude, and cannot bear to see another individual succeed. Unfortunate indeed is the over-jealous child, who is stirred up over the success of another. We find adults whose lives are less effective and whose happiness is marred by jealousy of others' success, even when it has no connection with their own. Elaborate and sometimes very subtle expressions of the jealousies of such adults are met with in daily life. They add neither to the amenities of life nor to the general welfare of the social group nor to the jealous person's happiness and mental health.

Expressions of Jealous Behavior Among Pre-School and Older Children. Children soon outgrow the earlier forms of express-

ing jealousy and no longer strike the older brother or sister who receives parental attention or affection. They may, however, continue to annoy, tease, or in some other way show their distress and resentment. Among children ten to twelve years of age gossiping, disparaging remarks, and retaliatory behavior may be found. The child may plan carefully and seek to stir up a quarrel between his friend and another child who has received too much of the friend's time and attention, thus seeking to prevent or break up their friendship. No limit seems to exist to the variety of responses which are called out by jealousy. The jealous child finds some of them more useful than others, the more utilized responses being those which are less likely to arouse an effective form of disapproval by adults or, in the case of children of the earlier gang ages, by his own group. Swaggering, strutting, an obvious appearance of not caring, conspicuous ignoring, cutting remarks, sarcastic allusions, may be observed. Sometimes we find indirect or imagined retaliation, as when the jealous child imagines himself as doing all sorts of things to get even. Or, he may daydream of his own achievement and make it a kind of compensation or self-glorifying.

We need not be surprised that jealousy gives rise to many ineffective forms of adjustment. It is caused by thwarting of desires and interference with plans, purposes, or activities. It is directed toward other individuals. The thwarting of desires is a common cause of maladjustments, as is shown in Chapter XVI. Children need to learn how to stand being thwarted, and how to manage thwartings successfully. The strong impulses from jealousy need to be directed into suitable channels. The child needs guidance and help that he may handle effectively these emotional outbursts.

Treatment of Jealousy. To lay down specific rules for helping the child make proper adjustments to situations arousing jealousy is a difficult task. It seems much more difficult than teaching him to know the number combinations in arithmetic, to recognize words in reading, or to spell correctly. Jealousy gives rise to impulses which not only are strong but also

are more or less blind and immediate. Children differ so much in their total makeup. The combination of various specific conditions in the environment at the time, overpotent elements of past experiences, the general family situation, and other factors are involved in emotional training. With due recognition of the difficulties in laying down rules to be applied rigorously, it seems that parents and teachers may help the child in some of the following ways.

From early infancy the child probably should not be the one center about which the entire family life revolves. If the child always has held the center of the stage in the home, he is likely to have more difficulty with jealousy than the child who has had less centering of attention upon him. When parents and relatives hang breathlessly and admiringly upon everything the little fellow does — things which normal children his age probably have done for generations — they are storing up future trouble for themselves, for others, and for the child. We do not mean that the child should be denied parental affection. We mean that parental affection should be harmonious with the intelligent guidance and control of the child. It should not be a mere emotional outlet or satisfaction for the parents. Of course, the little fellow is a darling, is cute, is "smart," takes after his mother or father, or some grandparent — is in fact all that his fond parents believe. All of these things, however, do not justify their "spoiling" him or making his future adjustments increasingly and unnecessarily difficult for him. The finer he is in all of these respects, the more should he have a decent chance to learn gradually and from an early age to make effectively those adjustments that life requires. If parents could adopt an objective attitude toward the child and his problems and not make their own satisfaction contingent upon their engaging emotionally in all of his relations with other children inside or outside of the home, they probably would help the child attain an objective attitude essential to good mental health, to desirable social development, and to the most effective moral character.

4. JOY, PLEASURE, DELIGHT, AND SIMILAR EMOTIONS

Genesis of Positive Reactions. Joy, pleasure, delight, elation, contentment, satisfaction, and other similar patterns of emotional response are usually thought of as positive reactions because the individual makes no effort to avoid, remove, or overcome the situations giving rise to them. On the contrary, he accepts and tries to continue the situations evoking them. As we have already seen, the child seeks to avoid situations which tend to lead to anger, pain, or fear. All such responses are known as negative reactions or negative behavior.

According to the theory advanced in the preceding chapter, the earliest emotional reaction is startle or excitement, an undifferentiated response to certain strong stimuli. By the time the child is a month old certain evidences of distress are seen. According to this theory, fear, anger, disgust, jealousy, and the like are derivations of the earlier emotion of distress. These are negative reactions. Delight is differentiated from general excitement probably by the third month. By the twelfth month the child manifests certain derivatives of delight, such as elation and probably affection. A little later affection becomes differentiated into affection for adults and for children. Sometime between the eighteenth and twenty-fourth month joy seems to make its appearance. Here we have the positive reactions which have developed out of delight. The positive emotional patterns, like the negative ones, develop by differentiation as maturation and learning have time and opportunity to make their contributions.

Causes and Manifestations of Joy, Delight, and Pleasure. A vast difference exists between the specific situations and events which produce delight, elation, joy, contentment, and the like in two-year-olds and those situations that evoke the same types of response in children at ten or twelve years of age. Noisy activities, pulling or tearing things to pieces, jabbering to other children, handling large objects that tax and show his strength, are the most common sources of delight for the two-

year-old. At ten or twelve, we also find some evidence that such situations and activities still have potency in evoking pleasure. The child at five or six may find considerable satisfaction in taking things apart for one reason or another; as, for example, pushing the doll's eyes and picking at them to see what makes them close. The boy at the age of ten years seems to enjoy noise — at least he makes enough of it — but probably he cares little about merely tearing things to pieces. He may have considerable curiosity at the age of six and later about the internal arrangement of the parts in some object, wanting to see what makes the wheels go round, or the clock hands turn. In order to find out what he wants to know he may take the object apart and be utterly unable to put it back together. This is not mere pulling things apart as found at the age of two or three years. It is curiosity and manipulation which yield the youngster his quota of satisfaction and delight. Feats of strength and skill give satisfaction at ten or twelve, partly because of social factors related to competition and group approval and disapproval. A significant difference in the causes of joy and satisfaction at early and later periods of childhood lies in the greater number of situations and the more complex situations which evoke them as the child grows older. He enjoys doing such a host of things, even though his expressions of joy and contentment are not so exuberant and noisy as at the age of two or three. Making things, playing games, and excelling in various activities are sources of satisfaction as seen in the discussion of interests in Chapter XII. Joy and satisfaction are aroused also by rhythmic movements in young children, even being manifested as early as the eighth or ninth month. The beginning of the aesthetic feelings, involving elements of pleasure and satisfaction found in the appreciations of music, literature, the dance, painting, sculpture, or other forms of art, may be observed among school children and pre-school children.

Bodily condition and general health are factors in determining whether the child under a particular stimulus will find delight and joy. The sick child, the irascible, sleepy child, and

the hungry child are little given to joy or delight while in these unfavorable physiological conditions.

Certain expressions of joy and delight seem to be constants in human behavior. They are found alike among infants, older children, adolescents, and adults, even to old age. Smiles and laughter are found in the nursery and we may on occasion hear an old man chuckling with delight over some highly amusing or pleasing experience. The child at two years of age has few inhibitions. He chuckles or laughs aloud to express his joy or delight. The older child and the adult, however, have built up inhibitions that keep them from the spontaneous expressions of strong pleasurable emotions. On many occasions laughter is taboo, as in some school functions, in church, or in other solemn gatherings of adults. So the child must learn to refrain from the vigorous overt expression of these positive emotions on many occasions. All the close observer may see is a twinkle of the eye, a nod or smile to some congenial person, or a smile through tightly compressed lips. Were he able to know the whole story, he might find an inner state of delight present, and solemn thoughts far removed.

Other expressions of joy or satisfaction are found in the generally relaxed state of the organism. It is in distinct contrast to the tenseness characteristic of fear, anger, and jealousy. However, it has been found²⁴ that strong delight and elation have a stimulating effect upon muscular action. Thus children, throwing rings upon a peg, were so elated when they threw a ring that on the next trial they often overthrew the target. There is a stimulus value to joy, satisfaction, and delight that indicates their importance in the guidance and control of children. Praise and reward are positive. Criticism, scolding, reproof, and punishment are negative. The positive values are to be preferred.

²⁴ See, for example, Goodenough and Brian, in *Journal of Experimental Psychology*, vol. 12, pp. 127-155.

5. AFFECTION

Causes and Expressions of Affection. Before he is twelve months old, the child shows affection for the adults who minister to his needs. He may even show such reactions as early as the eighth month. A short time after the age of twelve months the average child learns to kiss, and within two or three months thereafter he begins to show affection for other children. The earliest friendships are short-lived where children associate in groups and can form new alliances readily. These attachments may last from a few hours to a few days. At the age of two years friendships are longer, often lasting a few weeks. As children grow older and their range of travel is wider, propinquity has less to do with their friendships, and qualities of the friend play a more important rôle in his selection. Affection seems to develop toward persons and things which further the child's enjoyment. The child's affection for a toy may be seen, not only in infancy, but also in the pre-school period and thereafter. The little girl loves her rag doll and may show decided preference for it even after she has acquired many other more expensive and elaborate ones. Its softness or limpness may give satisfaction. Its familiarity may be an important factor in conditioning her affection for it. Anyone who has observed a child who is sorting over his toys is struck by the wide diversity of objects for which he has a strong liking. Upon being secured, a desired object may become immediately an object of affection, as when a child fondles a new doll, a toy automobile, a pair of roller skates, a story book, or sits and fondly looks at the new kiddie car or velocipede. Thus, a child of two, on receiving a little wooden cart, put her favorite rag doll in it and started happily about the room, singing lustily to her own tune "Here's-a goes-a cart-cart, here's-a goes-a cart-cart," and could hardly be separated from it at mealtime an hour or two later.

Smiling, laughing softly, patting, fondling, kissing, and looking longingly are some of the means used by children to express their affection for persons, pets, toys, or other objects.

Training may lead the child to be less demonstrative of his emotions as he gets older.

Dangers in the Development of Affection. Two important dangers are present in the child's development of affection, and against them precautions should be taken. His affection for his parents should not exclude affection for other children his own age. His affection or friendship should not be limited to one child. The danger that the child's affection for his parents may exclude friendship for children of his own age, obviously, lies in the difficulties which he will have in making the transition to the broader group life outside the home. The parents cannot keep him at home forever. They dare not remain the only persons upon whom he lavishes affection. Long before the teens are reached he must have other attachments. He will have much difficulty at school if affection for parents excludes others. Many a parent finds so much satisfaction in the child's affection for him that it is hard to allow him to build up affection for others. The parent wants it all for himself. Here also, the objective attitude toward the child and his problems is helpful. Real joy and comfort can come to the understanding and unselfish parent. He sees in his child's affection for others not a repudiation of or loss of affection for himself, but rather the broadening stream of development which eventually enables his child to become an independent, self-directed adult, taking that place in the world which the parent really desires for him.

In similar manner, it can easily be shown that it is not wise for a child to have only one friend among children of his own age. Without parental encouragement children often tend toward having one inseparable friend, but with parental encouragement the difficulty of the problem is accentuated. Thus a girl at the age of six and for years thereafter wanted just one girl friend. She lavished her affection upon the girl who at the time was her choice, and was with her at all possible times. The danger in having only one friend is shown by the great jealousy which this girl felt for all the other friends of the girl whom she idolized at a particular time. She did not want to play in a

group of girls. If she could not single out and monopolize the one girl, she would become quite angry at her and go home in a jealous rage. The pangs of jealousy were sharp indeed. Her parents wanted her to have many friends. A possible explanation lay in the fact that the girl had been sick a great deal. This may have occasioned an excessive amount of exclusive attention and affection.

A widening range of friendships seems desirable as the child gets older. The parents have the important problem of seeing that their children do have the right sort of friends. Bad companionship has been found¹⁵ to be a very common cause of juvenile delinquency. No companions and bad companions — these are the two extremes to be avoided.

6. OTHER EMOTIONS OF CHILDREN

Grief, sorrow, regret, worry, embarrassment, and other derivatives of "distress" or negative reactions, as well as emotions growing out of delight (the positive reactions), are increasingly evident as the child grows older. They are differentiations of the earlier emotions. These responses become organized with many other elements of behavior so as to form even more complex patterns of response, such as sympathy, pity, gratitude, and the like.

7. DEVELOPING EMOTIONAL CONTROL IN CHILDREN

In describing the specific emotional patterns of childhood, many suggestions already have been made concerning the guidance of the child's emotions. A number of further general principles may be offered, which deal with the attainment of emotional stability and maturity, which are important factors in the well-being and effectiveness of the child.

Conditions Favorable to Emotional Control. A number of conditions may be defined which help the child to attain emotional control.

¹⁵ See Healy and Bronner, *Delinquents and Criminals: Their Making and Unmaking*.

(1) *Good general health.* The child who is well nourished, who has sufficient sleep, and who is in good health has a better opportunity to learn emotional control than if he lacks these things. In order to make constructive adjustments to difficulties, good health is essential. The fretful, fearful child, or the one in whom rage is easily provoked, is often merely the child who is under-nourished, tired, or ill.

(2) *Wholesome parental attitudes.* The attitudes of parents have much influence upon the child's emotional development. The objective attitude is important. As much calmness and poise as the exigencies of life and the limitations of the parents' own emotional natures permit are also very significant for the child's emotional development.

(3) *Avoidance of too highly exciting events.* Young children should be kept free from the shock of too exciting events. They are commonly protected from many very exciting situations outside the home which seem too strong for them. Equally strong or stronger emotional upsets, however, may result from their witnessing parental wrangling and other turmoil at home. Exciting events are common. The child must be accustomed to meeting them adequately. But he needs a gradual transition rather than an abrupt introduction to the excessively stimulating events of the world.

(4) *Inhibition of overt expression of emotions.* The child from infancy to maturity is trained by society to express his emotions only in socially approved ways. He learns to inhibit many forms of emotional responses of which parents, playmates, and others disapprove. Although the outward expression may be inhibited, the stirred-up condition of the organism, the physiological and conscious elements, may be very marked. The inhibition of outward action while the inner response continues is not altogether desirable. In the majority of cases, however, the development of control of the outward expression occurs at the same time that experience or training is building up suitable modes of emotional reactions. Thus the individual is not unduly disturbed by exciting events and controls both outer and inner aspects of emotion together.

On the whole, forcing a child to inhibit the expression of the strong emotional responses of fear, anger, jealousy, and the like seems far less useful than either avoidance of the too highly exciting event or placing emphasis upon substitute activities of positive value. Usually inhibiting the expression of the emotions or inhibiting emotional responses is advised only in the case of fear, anger, jealousy, and other negative behavior. It is not so important that the child inhibits overt responses in the case of joy, delight, elation, contentment, and pleasure, although he may have to conform to certain customs about the times and places appropriate to such expressions. Serious, undesirable tensions rarely arise from having to inhibit laughter in some formal situation in which a ludicrous event inclines the individual to an uproarious outburst which is tabooed by the formality of the occasion. If inhibition of the expressions of joy and delight, however, is forced upon the child in such ways as to constitute for him a real blocking of activity, anger or a feeling of shame may arise. Usually, however, adults are tolerant enough of a child's *faux pas* that little danger of thwarting or shame exists.

(5) *Reinterpretation of the exciting stimuli.* Probably one of the most effective ways of controlling strong emotions is by changing the cognitive aspects of the situations evoking them. By this is meant that a different interpretation is placed upon the hitherto exciting events, and they are regarded as not-ex-citing. Aside from those situations that originally give rise to emotions, it appears that the sense organs are not, or need not be, the true receptors for emotional behavior, but that the integrative nervous mechanisms really are. Probably this is part of Maeterlinck's meaning when he says: "The event itself is pure water that flows from the pitcher of fate, and seldom has it either savor or perfume or color; but even as the soul itself may be wherein it seeks shelter, so will the event become joyous or sad, become tender or hateful, become deadly or quick with life."

Considerable evidence from clinical work and school training indicates that emotional control is built up by the individual's

seeing events in a different light and utilizing appropriate substitute activities. Familiarity, as has been shown, may help the child to see the fear-evoking situation differently. Emphasis upon other elements in an anger-arousing situation also may be helpful. Distinct value is found in having the child understand as well as possible situations which arouse strong, undesirable emotions. It is desirable to have him form the habit of wanting first to understand the situation, to see what it is, before responding to some one exciting feature of it. The old dictum about stepping to the mirror and stopping to count forty, or ten, or some other specified number when angry probably has some value. If the emotional response can be held in abeyance for a moment, the individual can know more about the situation and find a more effective solution than an emotional outburst.

Understanding the nature of the situation has value which has long been recognized. Thus Epictetus shrewdly observed: "Everything has two handles, one by which it may be borne; one by which it cannot. If your brother acts unjustly, do not lay hold on the affair by the handle of his injustice, for by that it cannot be borne; but rather by the opposite, that he is your brother, that he was brought up with you, and thus you will lay hold on it as it is to be borne."

Careful analysis of a situation before responding may profitably be made a habitual mode of behavior. Thus is the exciting event robbed of many of its undesirable emotional aspects. To lead the child along this path and to develop in him such protective habits is no mean task. To its successful achievement parents and teachers may well devote much thought, self-control, and patient endeavor. Only by some such means as the foregoing can we expect the child to reach that stage of emotional maturity in which the emotions serve their useful functions in his life.

The Emotional Maturing of Children. Emotional maturing during childhood means (1) that the child has differentiated a large number of emotional patterns of response which are combined intricately with other elements of behavior; (2) that he

has become accustomed to many stimuli, so that they no longer evoke emotion; (3) that he has modified his emotional reactions so that very strong and primitive outbursts do not interfere with his happiness and general effectiveness; (4) that he has built up friendship and affection for many children his own age so that his parents do not dominate his affections to the exclusion of all others; (5) that, in summary, he has acquired considerable emotional control and stability, so that emotions serve his life purposes instead of interfering with them.

SELECTED REFERENCES

Two research monographs on children's emotions are *Anger in Young Children*, by Goodenough, and *Children's Fears, Dreams, Wishes, Daydreams, Likes, Dislikes Pleasant and Unpleasant Memories*, by Jersild, Markey, and Jersild Bridges, in *The Social and Emotional Development of the Pre-School Child*, chaps. 8-15, reports observations and experiments on the emotional behavior of children and gives an "emotional development scale." Groves, in *Personality and Social Adjustment* (revised), chaps. 13, 14, discusses the emotional maturing of boys and girls; Jersild, in *Child Psychology*, chaps. 4-6, gives an account of children's emotional responses from infancy on; Mary Cover Jones, in chap. 6, *Handbook of Child Psychology* (revised edition, edited by Murchison), discusses emotional development and gives a bibliography of 80 titles to 1932. Blatz and Bott, in *Parents and the Pre-School Child*, Part I, chaps. 9, 10, consider fears and temper tantrums; Thom, in chaps. 9-11 of *Everyday Problems of the Everyday Child*, gives suggestions for dealing with anger, fear, and jealousy; Pressey, in chap. 6, *Psychology and the New Education*, considers emotional stress and discipline. See also Stoddard and Wellman, *Child Psychology*, chap. 14.

Additional references are given at the end of this volume.

CHAPTER XII

MOTIVATION DURING CHILDHOOD

TO UNDERSTAND adults adequately, it is necessary to know not only how they behave, but also *why* they act as they do. To understand children adequately, it is essential to know the reasons underlying their behavior, why they do one thing rather than another in a given situation. This knowledge is even more needed in the case of children since they are often less well understood than are adults, probably because, in their immaturity, they are so much different. A fundamental psychological hypothesis is that behavior results from causes. A child refuses to eat spinach, slops through a puddle of water, fills his pockets with a wide variety of odds and ends of "useless" things, spends hours making a "skate-o-mobile," throws stones at the neighbor's cat, draws pictures or caricatures on the margin of some book, is careless, stubborn, or does any one of a thousand other things. The parent or teacher, perplexed and with patience exhausted by the child's behavior, may well wonder if any reason exists for the disturbing responses of the child whose guidance and direction lie in his keeping. Upon reflection and investigation, one must conclude that no act in the vast repertory of human reactions is uncaused — is merely a matter of chance. Chance, aside from its mathematical connotation of possibility or probability, is merely the name given to unknown or unanalyzed forces. Even when dice or coins are thrown, the faces or sides lying upward are the result of the various complex forces acting upon them. The forces motivating behavior are similarly complex, but an attempt to discover their essential nature will be a profitable enterprise.

What are the fundamental drives in children? What are the important motives directing their conduct? How are these developed or modified? Whence do motives come, or

what are their sources? What is the relative importance of original nature and learning in motivation? What part do purposes, attitudes, ideals, and interests play in motivating childhood behavior? In what things are children interested at various ages from birth to maturity? These are important problems to which we must now turn our attention if we would secure a fruitful understanding of child nature.

I. MEANING AND IMPORTANCE OF MOTIVES AND DRIVES

The Practical Importance of Motives and Drives. Psychologists have been interested in the study of human motivation only in recent years. Earlier psychological approaches gave little attention to why the individual behaved as he did. The major emphasis was upon the structure and mechanisms of behavior, topics of considerable importance, but not adequate to a complete understanding of human beings. The motives of behavior, if considered at all, formerly were postulated in terms of such unchanging entities as instincts of self-preservation, gregariousness, industry, workmanship, destructiveness, constructiveness, and the like, which are discussed presently.

In spite of the professional apathy to the problems of motivation, persons outside the field of psychology have given attention to the reasons underlying human conduct. Recognition of the importance of motivation has been made in the fields of jurisprudence, business, politics, and many others. The salesman, the advertiser, the politician, the public speaker, all those whose occupations require them to influence the behavior of others, have long known the practical importance of human motives. At the present time the importance of motives in understanding and directing human behavior is widely recognized.

Credit for placing major emphasis upon the psychological study of human motives belongs to the psychoanalysts more than to any other group. They have exerted a powerful influence on the development of psychology. Whether one accepts

or rejects many features of their theories and techniques, there can be little doubt about the value of the psychoanalysts' insistence upon studying human beings as dynamic organisms. Psychology, physiology, and sociology, however, have made important advances in recent years in providing fundamental knowledge on this subject. Our discussion, however, should not imply that we actually can unravel and know all of the motives which direct an individual's conduct, because such is not the case. Life is too complex and human motives often are too subtle for us to know definitely and conclusively what the latter are, but important advances have been made in the attack on this fundamental problem of human behavior, the motives of men.

The Importance of Knowing Children's Motives. Teachers, parents, and others who guide and direct the behavior of children can do so to best advantage only if they really understand them. Obviously, such an understanding is dependent upon knowing why the child at a particular time does what he does.

A nine-year-old girl, large for her age, comes home with her best shoes not only covered with mud, but her stockings or socks are also covered with mud halfway to her knees, and splotches of mud are on her dress. The mother has told her "a thousand times" to keep out of the mud and has scolded and punished her for getting her shoes and other clothes muddy. To her the girl's behavior is perverse indeed, and the child may be punished severely for disobeying her mother's previous ultimatum, especially if the mother is crowded with work, has a headache, or is under some other strain. A boy of eight, going to school, takes a short-cut across the corner of a large newly seeded lawn, although he has been told repeatedly to keep out. He is a quiet, well-behaved boy, but persists in cutting across the lawn despite scoldings and threats to notify his parents and the police. Regardless of what is done to handle these two cases, the mother and the lawn-owner probably can secure a more effective modification of behavior if they understand why the girl got so muddy and why the boy

uses the much objected-to short-cut. The girl, taunted and teased by a young bully's remarks, finally in desperation gives chase through a muddy garden and settles the matter. While on his way to school when in the first grade the boy had been very badly frightened by a cross dog on the next street. He had cut through a vacant lot, and for two years had been going to school this way. A new house had been built and the lot graded and seeded. The boy was still using the accustomed way although the cross dog no longer lived on the next street.

Rational guidance and control of children are contingent upon understanding the motives which activate them.

Barrenness of Older Views of Instinctive Drives. Some of the earlier attempts at understanding human behavior postulated a series of entities known as instincts which acted as drives or springs to action. Thus, an individual was said to have a drive or urge to do those things which led to self-preservation because he had an instinct or instinctive urge of self-preservation. He was said to want to be with other persons because of the drive from the gregarious or social instinct. If he tore things to pieces this was because of his instinct of destructiveness, or if he put things together in some way it was because of the constructive instinct! On the whole such attempts to understand human motives have not carried us very far. Part of the difficulty, but not all, lies in the fact that the term instinct has been used with at least two diverse meanings. Sometimes it means stimulus arousal of an activity, and sometimes it means a pattern or kind of activity itself. Thus it is used to mean the motivation of an activity, as in pugnacity, curiosity, gregariousness, parental love, and the like; whereas in other cases it refers to the kind of activity, as when it was alleged that walking, manipulation, collecting, etc., were instincts.²

Trying to understand complex human behavior by postulating such entities seems to break down in the study of actual

² Cf. Dashiell, *Fundamentals of Objective Psychology*. He says, "The classic notion of 'instincts' as God-given faculties mysteriously implanted in animals to guide them aright has given place to inquiries of more scientific types, but contemporary discussions are remarkable for the amount of misunderstanding and confusion traceable to the vagueness of this one term" (p. 183).

cases. On this point Dr. C. M. Campbell, psychiatrist in the Harvard Medical School, says: "The complexity of a concrete case, such as a wayward adolescent, is often impossible to formulate in terms of any disordered balance of a group of instincts. One is forced to admit that while in the total complexity one can trace here and there certain familiar elements, such as anger reactions, self-assertion, etc., there is a large residual which cannot be thus analyzed. The concept of instinct only carries us a short distance in the analysis of the case, unless one is willing to indulge in speculative formulations."²

The discussion of mass activity in several previous chapters should make it clear that definite, clear-cut, specific, fixed-in-advance patterns of behavior are rare indeed, and that diffuse, non-specific mass activity is generally the rule, the former developing after experience, learning, or habit formation has played its part in the infant's development. The definite patterns of response called for by the instinct theory are not found upon careful observation of infants during the first few days or weeks of post-natal life; neither does it seem fruitful to suppose entities (instincts or springs of action) concealed inside us, which, when stimulated, make us do this, that, or some other thing. Such a description of human motivation has little to commend it aside from tradition.³

Drives and Motives. The important terms *drive* and *motive* are sometimes used almost synonymously, while other writers make a distinction between these two concepts. Woodworth⁴ uses the term "drive" broadly to mean the stimuli which arouse the individual to activity. He uses as an illustration the pitcher in a baseball game, "drive" including "such questions as why he is engaged in this exercise at all, why he pitches better on

² *Journal of Abnormal and Social Psychology*, vol. 16, p. 244.

³ To many it seems unfortunate that the term instinct has been used with these diverse meanings. Many psychologists continue to use the term and are trying to give it a more definite connotation. We are loath to give up the term, but we are inclined to believe that, in time, it will disappear from descriptions of human nature found in textbooks on scientific psychology.

⁴ *Dynamic Psychology*, pp. 36-37.

one day than another, why he rouses himself more against one than another batter, and many similar questions." Dashiell,⁵ however, uses the term "drive" in a narrower sense. For him the problem of drives refers to the "original sources of energy that activate the human organism, that set it going." Motives refer to the "lines or directions" along which the organism proceeds, once it is set going. Sometimes motives are classified as primary or impelling, and secondary or directing. When drive and motive are differentiated, as in Dashiell's arrangement, "drive" is primarily a problem of original or unlearned human behavior, whereas "motive" is chiefly a matter of learned or acquired human nature.

For the present discussion, it seems unnecessary to make too fine a distinction between "drive" and "motive." The problem of drives or motives is the problem of why we act as we do, of what stimuli, urges, desires, or purposes impel us. The psychologist includes a wider variety of concepts under the term motivation than does the layman. The latter looks only for conscious or rational purposes, while the psychologist includes various physiological conditions that give rise to simpler motives, as in hunger or thirst, as well as the more complex forms of motivation.

2. SOURCES OF MOTIVES OR DRIVES

Physiological Conditions as Sources of Simpler Motives. The simpler types of motivation are based on the fundamental physiological processes of the organism. Although often overlooked or undervalued, these factors are of great importance in human life, and especially so in childhood. Much of the restless activity of the young is motivated by these simple drives, and even some more complex forms of motivation are learned elaborations of them. Among the physiological motives described here are hunger, thirst, elimination, temperature control, rest and sleep, and sex.

(1) *Hunger.* Hunger is caused by contractions of the smooth

⁵ *Op. cit.*, pp. 230 ff.

muscles of the walls of the stomach, which seem to appear and disappear at regular intervals. That they provide a fundamental drive is well known. The hungry person is restless; the hungry infant likewise is restless and given to much overt activity which tends to subside as hunger is satisfied. A very significant study by Wada ⁶ has shown that both during sleep and when awake human beings have more striped muscle activity when the smooth muscles of the stomach walls are making their rhythmic hunger contractions. Probably the tissues whose food supply is exhausted give off into the blood a substance that stimulates the nervous system to start the stomach muscles contracting.

The importance of this drive in human history can hardly be overestimated. Food supply, with "fat" and "lean" years, is a fundamental problem in any national economy. In one primitive group fish was very scarce. Stealing fish was punishable by death, although stealing various other things such as another person's wife was not a capital offense. The hunger drive is equally important in the life of the child, with its implications for overt behavior and general bodily vigor.

The whole mechanism for the intake and digestion of food is ready to function at birth. With growth and maturation come changes, as well as through social control. Sometime around the sixth month the teeth begin to erupt, and when this process has proceeded far enough solid foods are included in the diet. Three phases of the hunger rhythm are found from birth. The period of restlessness, already referred to, is evidence of an organic need. Among infants this may be marked also by crying or other evidences of discomfort. This is followed by the responses of feeding — sucking and swallowing. Then follows the period of quiescence during which the infant sleeps or is active in some way not related to hunger. In children and adults these three phases also are found. The feeding schedule and other features incident to the satisfaction of hunger (use of spoon, cup, etc.) are arranged not only to meet the child's requirements but also to meet those of

⁶ *Experimental Study of Hunger in Its Relation to Activity.*

society.⁷ As children develop, problems of poor adjustment may arise over eating, such as eating between meals, poor or irregular appetite, dislike for or refusal to eat certain foods, refusal of any food, refusal to drink from a cup or to feed self, etc. Lack of regular routine probably is responsible more than anything else for wanting to eat between meals and for poor or irregular appetite. On the whole, maladjustments like these seem to be due primarily to poor training; the child has learned the particular undesirable behavior from the training he has had.

(2) *Thirst*. Drives to overt behavior arise also from dryness of the mucous lining of the mouth and throat. Usually this means also a certain amount of water deficiency in the tissues. Saliva usually keeps the mouth and throat moist. As the body tissues become dehydrated, the saliva is no longer secreted in quantity sufficient to supply moisture to the mouth and throat.

As thirst develops the child or adult becomes restless, and, in fact, shows about the same rhythm phases as in hunger: restlessness, satisfaction, and quiescence. The significance and strength of the drive resulting from this tissue need are similar also to those in the case of hunger. The mechanisms involved are ready to function at birth.

(3) *Elimination*. Many diverse structures and functional processes are involved in the elimination of waste products from the body. Water is eliminated by the lungs, the kidneys, the skin, and the lower intestine. Carbon dioxide is eliminated by the lungs, soluble salts by the kidneys, salts in solution by the skin, and insoluble waste products by the lower intestine. Of psychological importance are the features of these processes which are subject to modification and control for desirable social development. Breathing and the elimination of waste products by the sweat glands of the skin are well established soon after birth and are little modified by child training except in so far as training in breathing is given for

⁷ For references discussing the food requirements of children, see the bibliography at the end of Chapter XVII.

singing, sports, and the like. The eliminative functions involving the bladder and lower bowel are of significance in child training because of their bearing on social adjustments. Adequate control of these processes is necessary for the protection of society, that is, for reasons of sanitation. Their control has significance also because of the social taboos developed about them, such as shame and modesty.

Three phases are observed in the rhythms of bladder and lower bowel elimination, corresponding to those in hunger and thirst. First is the period of accumulating pressure which directly necessitates and stimulates elimination. It is followed by that in which some response is made satisfying the drive. Finally ensues the period of relaxation, rest, or quiescence so far as elimination is concerned. Apparently, sensory experiences are involved, both in the increasing pressure of distention and in the eliminative responses, because voluntary control otherwise would be impossible.

During the first few months of post-natal life these processes are involuntary, but with maturation comes the possibility of developing voluntary control. With increasing age the frequency of these two eliminative responses decreases. The eighth month is usually the time to begin training in voluntary bladder control, and by the age of two years the child normally will be able to keep himself dry in the daytime.⁸ Similar control while asleep is not developed so soon, but if training is begun shortly after the end of the first year, control may be expected normally to develop by the end of the third year. Training in voluntary bowel control usually may begin advantageously about the end of the first month, and regular habits may be expected to be established by the end of the third or fourth month. The value of shame as an incentive in developing adequate voluntary control is seriously questioned. Intestinal or digestive difficulties, of course, may be expected to interfere with the regular routine being established for these functions.

(4) *Unfavorable temperature liberation through the skin.* The

⁸ Cf. Blatz and Bott, *The Management of Young Children*.

human organism tends to maintain a constant body temperature at around 98.6° F. Regardless of weather or season the skin keeps the bodily temperature very nearly constant. Even a variation from normal of a few degrees is a sign of sickness, and a deviation of as much as eight degrees from the usual standard is evidence of very serious illness indeed.

The combustion processes of the body produce or liberate a great amount of heat. The metabolic functions of the body require only a small part of it. The remainder is given off, chiefly through the skin. With variations in the temperature surrounding the body, in the amount of clothing, and in internal bodily conditions (as in fever), marked changes occur in the rate of temperature release through the skin. An excessive rate of release or a subnormal rate is a powerful stimulus to activity. Many writers⁹ have emphasized the rôle of temperature and humidity upon man's mental and bodily efficiency and cultural development. They have shown that torrid and arctic regions have not developed a high state of civilization and culture, and that science, literature, and other forms of art have been developed chiefly in the more favorable temperature of the temperate zones.

Dashiell¹⁰ includes unfavorable temperature liberation through the skin as one of the tissue needs giving rise to fundamental drives to overt behavior, resembling in this respect the great drives from hunger, thirst, and elimination. He also points out the place of this drive in seeking and developing shelter and clothing, and suggests that "the gregarious form of life among some animals at least is undoubtedly an outgrowth of unfavorable skin conditions," and that "their original 'sociability' is a huddling together of individuals who have been restlessly moving about until the warmth of each other's bodies furnished enough heat to allow the organisms to come to rest — as is easily observed in the nestling together of very young animals."

⁹ Cf., for example, Huntington, *Civilization and Climate*, or Whitbeck and Thomas, *The Geographic Factor*, for a detailed discussion of the influence of climate upon man's bodily and mental activities and cultural development.

¹⁰ *Op. cit.*, pp. 238-242.

(5) *Rest and sleep.* When the striped or skeletal muscles are fatigued the individual seeks rest, and when they are rested he again seeks activity. Activity and rest thus alternate with each other in a rhythm analogous to that of hunger and eating. Rest is a normal need of the organism, and may be required by other factors than muscular fatigue alone. The hygiene value of rest and sleep is well known. The alternation of activity and rest is best seen in the case of the heart. The brief rest period after each beat occupies approximately one-third of the time, so that the heart muscle has abundant rest, which enables it to do its work for all the years of life.

That maturation plays a part in rest and sleep is shown by the decreasing amount of sleep needed as the child passes through the stages of infancy, early, middle, and late childhood, adolescence, and maturity. Problems of social control relate to training the child to sleep at times that meet his own needs and fit in with the convenience of the other members of the household. To regard sleep as a pleasure, and not to use it as a punishment seems highly desirable.

(6) *Sex.* One of the most powerful drives is that of sex. During infancy and childhood the drive is manifested largely in connection with stimulating the erogenous zones and auto-eroticism. The child's natural curiosity about sex is stimulated by many conditions and events in the environment. Inhibitions and taboos often repel the child's innocent and perfectly natural questions on sex matters as something nasty, unclean, or "bad," and prevent him from receiving adequate training. Accordingly, we reasonably may expect difficulties in the individual's control of this powerful fundamental drive along socially approved lines. The problems of sex education are considered in Chapter XVII.

Other Physiological Conditions as Sources of Drives. When the skin is injured, strong defensive reactions follow, involving the skeletal muscles. If the pain is intense and continues for some time, the smooth musculature also is involved. Gently stroking or patting the skin tends toward relaxation of the muscles. Its therapeutic value in cases of restlessness, nerv-

ousness, and insomnia is well known and need not be based upon the psychoanalyst's view of stimulating "erotic zones."

Change or shifting of attention seems also to be a normal human activity, motivated by the boredom which follows a period of attentive regard (which may be too short for fatigue to enter) or by the urge to active seeking of different perceptual or other fields. This probably is somewhat like Thorndike's tendency toward "multiform mental activity." Whatever the exact nature of this motive may be, we do not doubt its existence. Such a motive or drive is of inestimable value, insuring a wealth of sensory, perceptual, and other experiences.

Emotion as a Source of Motive. Emotional states constitute another important original source of vigorous and directed, or motivated, behavior. In the two preceding chapters, attention was called frequently to the intense character of the emotional response. An emotional state involves an upset condition of the visceral organs which, in a sense, is not unlike the conditions found in hunger and the other appetitive drives. This visceral state may act as a strong internal stimulus, impelling the individual to activity.

Strong emotional states of the type of fear and rage are likely to stimulate intense physical activities which are, originally, of an uncoordinated nature. A three-year-old who is angered by another child's appropriating a cherished toy may resort to tears, may hold on to the toy, may try to pull it from the other's hands, or may strike, kick, or shove the offender. He selects one response or another according to the circumstances and his own past experiences, but the emotional state is the motivating factor throughout. As children mature, the character of the outward response to emotion usually becomes modified. A young child who is angered may respond by striking. A few years later, when enraged, he may respond only by angry words and facial expression. As he comes into the teens and social pressure is exerting its influence more effectively, he may respond merely by angry looks. As an adult the individual may not change his expression, but may make a remark that does not reveal the inner turmoil that he

feels. Even in this last case, however, the stimulating effect of the emotional state may be present, although held in check, and may lead to the highly pertinent reply.

The milder organic states, such as those elicited by a full stomach, by loving attention, or by certain features of enjoying music or art, are sometimes designated as pleasant or relaxed emotions. These also may have an effect on the motivated behavior of the individual, reducing the activity of skeletal muscles and tending toward repose and compliance. Various internal states, therefore, may have the same effects as tissue needs in stimulating the various reactive mechanisms of the individual. The internal drives based on emotion are of great importance in the development of the social motives and in the mental hygiene of the individual. (See Chapters XVI and XVII.)

3. THE DEVELOPMENT OF MOTIVES

Native and Acquired Factors in Motivation. Just as native or unlearned responses lie at the basis of all behavior, so the fundamental organic drives are the foundations of all motivation. The essential vigor of human responses arises from the internal conditions of the body. The elementary motives that have been discussed so far may be considered as native ones. Most of these, such as hunger, thirst, unfavorable temperature liberation through the skin, rest and sleep, elimination of waste products, certain aspects of sex, and the effects of emotional states, are internal. Some external stimuli also may be regarded as native arousers of behavior. These include tissue injury and other forms of excessively intense stimulation, and those milder skin stimuli leading to the so-called "love" responses. In general, the internal stimuli are originally more important than the external ones. External stimuli may set off responses, but these are directed, facilitated, or inhibited by the inner state. The total organism, with its characteristic structures and functions as organized into a living whole, possesses the energy and the modes of response which the stim-

ulus only releases. As Dashiell ²² says, "The key to man and to subhuman forms is to be sought more in the enormously complex energy changes going on within him than in the fortuitous play of outside energies working on him."

In the course of the development of motives, external stimuli come to play a larger part, but the essential controlling forces remain those within the organism.

The Modification of Motives. Problems of child behavior are complicated by the inextricable blending of native and acquired elements. Conditioning, learning, and habit formation begin the transformation of native responses immediately after birth. Acquired motives are largely developments from the early native ones, but the origin and development of a motive activating the child at the age of ten or twelve years only rarely can be traced in adequate detail. Habits, purposes, and ideals are still more complex forms of acquired motives, although even in these, the native elements might be found to furnish important parts of the total pattern, if we could only resolve it into its native and acquired components.

We see this process of modifying or conditioning drives in many features of child development, as when some external stimuli are substituted for the earlier internal native ones. Thus, at first the stimuli to play probably come from within, but later external stimulation may set off these activities, as when the child sees other children with whom he plays. The sight or smell of food may come to elicit responses which are aroused originally only by the actual pangs of hunger. Merely thinking about food may start off the flow of saliva which originally was activated by the sight or smell of food. Thus, organic drives eventuating in positive (or negative) responses may become conditioned to various external stimuli. The sight, taste, smell, color, or merely the idea of an object associated with some unpleasant event may come to arouse the response originally evoked by that event. A child at a very early age is bitten by a large black dog. For years he may be decidedly afraid of dogs, and he may even find himself making incipient

²² *Op. cit.*, p. 233.

negative responses to a wide variety of objects that in some way resemble the black dog. A boy of six stepped on the tail of a sleeping Scotch collie, whereupon the dog lunged for the boy's throat, but jumped too high, sinking his two tusks in the boy's upper lip. For years the boy had a violent fear of large dogs, although he had always played with dogs and continued to play with dogs which were not strange to him. A boy of ten, trying to slide on the ice on a little pond into which refuse from a paper mill was dumped, broke through the thin ice which covered the shallow water and sank in above his waist. For some minutes he was doubtful of his ability to extricate himself. Finally he got hold of a branch of a small willow tree and pulled himself toward the bank and out of the thick, slimy, vile-smelling, nauseating stuff. He, too, for years, at the sight of any place where the ground was yellowish, which had a small shallow puddle of clear water on part of it, and had a few small straggly willow trees about, not only felt afraid, but also felt strong disgust and some nausea at the anticipated thick, slimy, vile-smelling refuse. Even now, in maturity, although he cannot recall vividly the appearance of the place where he had the unpleasant experience, he occasionally sees a place which he instantly recognizes as like that of the childhood episode, and has some feeling of disgust and aversion.

It is evident from the above instances that the principal mechanism operating in the substitution of motive-stimuli is that of the conditioned reaction. By the simultaneous occurrence of an external stimulus with the original internal or sufficient one, the former becomes capable of evoking the behavior in question. This pattern of learning applies as clearly in the case of motives, likes, aversions, and interests as in simpler muscular or glandular responses.

Another class of stimuli, words, come to act as motives through the operation of the same processes of learning. The development of language permits the visual or auditory symbols of things to function in place of the things themselves. Commands, offers of reward, soothing commendations, all commonly act as motives at the earliest ages in which language

is understood. As the child grows older, the motivating power of language symbols increases with his experience with them.

Social Motives. In addition to the motives that serve the individual's physiological needs, other forms of motivated behavior relate to his typical contacts with other people, which might be styled his *social needs*. These social motives were once thought to be primary and native (as by the "instinct theory") but may now be shown to arise from the simpler tissue needs and emotional states. Social motives are learned forms of behavior, and hence may differ considerably from person to person. In spite of individual differences, however, some patterns of social motivation are sufficiently common to justify enumerating them and indicating their principal sources.

(1) The need for *prestige* or the desire for *social recognition* is a very important social motive. To the stimulus of the presence of other people, the individual acts in such a way as to win attention, approval, and recognition. Much of the child's behavior is activated by this powerful motive. If deprived of the attention of a group, the child "shows off" or becomes noisy. Even serious delinquency may be motivated in this way, as when a youngster seeks to be a "tough guy" in the eyes of other children. On the other hand, some may find apparent modesty, docility, or humility a means of gaining recognition, as in the case of Uriah Heep who boasted of his "humbleness."

The need for recognition and attention is derived from the satisfaction of the individual's physiological needs in infancy. Whenever ameliorative satisfactions such as those resulting from feeding, warming, or petting are administered, some person is present and is giving attention to the infant. Moreover, these services are frequently accompanied by kind words, regards, and gestures. Learning occurs, which causes the attention of human beings to be esteemed and sought throughout the rest of life.

(2) Another important social motive is the need for *security*. Persons, and especially children, need to feel that they are wanted and loved, and that they will be cared for. The origin

of this motive is very similar to that of prestige and recognition. Because his needs are so great, the infant must depend on others for his welfare. Although constantly modified throughout the various stages of life, the security motive remains a strong one.

(3) The need for *pre-eminence* or *mastery* is very marked in child and adult behavior. Persons seek to excel, to get ahead, to worst rivals, and to overcome obstructions. If frustrated in the normal attainment of this goal, they often will assume an excessive aggressiveness toward substitute objects, resulting in bullying, quarrelsomeness, and, in some instances, delinquency.

The pre-eminence motive seems to be based on the rage behavior of infancy. If blocked or restrained in activity, the infant will display an intense emotional reaction and strong uncoordinated activity. Later, other situations come to arouse the same intensely motivated response, as when commands, the competition of other children, or material obstructions to be overcome, restrain him. The motivation, under proper training, is redirected from useless responses into persistence and effort. The pre-eminence desire is a very useful one in human affairs, motivating desirable forms of ambition and labor as well as the less socialized efforts toward mastery.

(4) Persons are usually strongly motivated toward *conformity*. They desire to do the expected thing, to have the appearance of other people; they fear to be "different" or to receive scorn or blame. In a sense, this is the converse of the prestige motive but is not merely a passive desire to avoid losing approval. The conformity motive is undoubtedly related to the fear reactions of the infancy period. Whenever an adequate stimulus for fear, such as painful punishment by parents or a pummeling by child associates, is accompanied by blame, criticism, or condemnation, a conditioning occurs. Thereafter, attitudes of expressed or implied criticism tend to arouse the original strong, fear-motivated avoidance reactions. In general, conformity motivation is an inferior form of drive, which might well be eliminated. Social control is as adequately and

more humanely achieved through the milder motives of prestige, security, and pre-eminence.

Habits, Purposes, and Ideals as Motives. Other complex learned motives arise from habit formation and from the acquisition of purposes and ideals. A child who has formed a strong habit of any kind tends to respond with that habitual reaction to the appropriate stimulation. This is one of the greatest values of habit in human behavior. The motivating force of habit is not unrelated to the simpler and more basic forms of motivation, however. To eat at a certain hour is a habit, and an individual becomes restless if his meal is delayed. To eat at some time, of course, is one of the most fundamental of motives, and the particular habit is based on this need. Thus the child may "learn" to like spinach and olives and may have a definite desire for them which he previously did not have. Many more complex forms of motivation shown in social situations have a similar origin. They are based on the original needs of the organism, but are developed through complicated processes of learning.

There is another very important factor in the relationship of habit to motivation. If a child has become accustomed or habituated to an excessive amount of some satisfaction he will be strongly motivated to seek it. The child who has been given candy cries for more. Similarly, the youngster who has been petted and protected in too great a degree is likely to spend the rest of his life looking for sympathy and guidance. To be dependent is satisfying for the child, but to have this satisfaction continued into later life is a social handicap.

Purposes and ideals also are motivating forces in the individual's behavior. A small boy may want a wagon, "skate-mobile," or scooter. He asks his father to get it for him, and the father does so. In this instance, little overt behavior is observable that may be attributed to the drive of his desire, want, or purpose. Suppose, however, that the father cannot afford to buy the scooter. The boy, if suitably trained to depend upon himself for the satisfaction of many of his own wants, may hunt about to find the necessary parts, materials,

and tools and set to work making his own "skate-o-mobile" or wagon. For hours he may work at it, making many mistakes, bruising his fingers or getting splinters in them, having to try several times before he succeeds. Or the little girl who makes clothes for her doll has many things to learn and may have such high standards of excellence that she literally will work for hours, asking her mother many questions and doing things over and over, before she is satisfied with the result. Even at a younger age, long before children enter first grade, we see evidence of some purpose or desire activating their behavior, as, for example, when a child of three or four years of age uses some blocks to build a house. The purpose in mind or incentive is not only a motivating force in the child's behavior, but it is also an organizing force through which his activities are integrated in accomplishing a given goal. The formation of suitable purposes and ideals is one of the most significant processes in the development of effective human personality. Reliance upon self in accomplishing many of his purposes is an excellent thing for the child. Even in infancy it seems desirable that the child relieve some of his own wants. If, for example, he is in an uncomfortable and cramped position and begins to cry, his own wriggling, squirming, and thrashing about are likely to overcome his discomfort. He thus learns to adjust independently, instead of expecting assistance. Purposes and ideals of children are likely to be concrete and relatively simple. They are often the expression or outgrowth of their "interests," which are thus also powerful motivating forces.

4. CHILDREN'S INTERESTS AS MOTIVES

What is meant by interest? To what extent do interests motivate the child's behavior? Of what importance are they in his development? How closely are interests related to aptitude and maturity? What fundamental directions do the child's interests take? What are his recreational, social, intellectual, aesthetic, and vocational interests during the first

dozen years of his life? What is the significance of his interests in motion pictures? What are the practical guides and effective laws and principles for developing wholesome interests? These are important questions for all who would understand the forces motivating children's behavior.

The Meaning of Interest. Interest has two diverse meanings in psychological usage. It means a condition or cause of attention; it also refers to the feeling of pleasure resulting from giving attention to something or from experiencing something. Webster defines interest as "excitement of feeling accompanying special attention to some object; concern; as, an interest in Botany." Thus, this term has been used to refer both to the cause and to the result of giving attention or of experiencing. Using the word in the first sense, we say the boy gets out his blocks because he is interested in building a house, or the little girl makes a doll dress because she is interested in having lots of clothes for her doll. Using it in the second sense, that of a resultant feeling of pleasure, we say the child is interested in playing at building a house or making doll dresses. These two meanings, while diverse, are closely related in the experiences and behavior of the child. Interest which is a result of the feeling of pleasure attendant upon some event or experience tends to condition the child in such a way that he later on does attend to that experience, object, or event because of the pleasure which resulted from previously experiencing or attending to it. This is merely saying that the result of a previous response may be, and frequently is, a present cause of repeating that response. Similarly, a present result may be a future cause. At any rate, interests are motives and often have very strong activating influence on the child's behavior.

Dewey,¹² in discussing interest, notes two types of pleasure. One accompanies activity which is directed toward meeting the needs of the organism. The other arises from contact; its stimuli are external; the organism is receptive and more or less passive. When objects are made interesting to the individual, the second kind of pleasure is involved. Dewey

¹² *Interest and Effort in Education*, pp. 12-13.

says, "Genuine interest is the accompaniment of the identification, through action, of the self with some object or idea, because of the necessity of that object or idea for the maintenance of a self-initiated activity. Effort, in the sense in which it may be opposed to interest, implies a separation between the self and the fact to be mastered or task to be performed, and sets up an habitual division of activities. Externally, we have mechanical habits with no mental end or value. Internally, we have random energy or mind-wandering, a sequence of ideas with no end at all, because they are not brought to a focus in action. Interest, in the sense in which it is opposed to effort, means simply an excitation of the sense organ to give pleasure, resulting in strain on one side and listlessness on the other."¹³ He also notes that genuine interest is active, projective, or propulsive, is objective in that it does not end simply in itself, as some feelings may, but involves some object of regard, and is personal, signifying direct concern. The emotional side of interest is quite as significant as its active and objective sides.

Importance of Interests During Childhood. The value of many wholesome interests in the life of the child can hardly be overestimated. They bring him into vital contact with many activities. They provide a wealth of experiences because a child interested in an activity tends to engage in it. Sampling many lines of activity not only serves an exploratory function but also tends toward breadth of personality because of the wide range of experiences. Under these circumstances little danger exists of developing a narrow, one-sided personality. Out of a wealth of experiences may come a desirable breadth of appreciations. A wealth of interests also is important because it facilitates substitution in case of thwarting and helps the child avoid some conflicts which otherwise might arise. If he has many interests, he can, when blocked in respect to one of them, turn the more readily and with less strain from one interesting activity to some other one. Thus, many-sided interests have mental hygiene value not only during childhood, but also during adolescence and adult life. As the years of

¹³ *Op. cit.*, p. 14.

childhood pass and the child comes into adolescence, we normally find some interests more permanent and of greater strength. Efficiency is dependent upon a few intense abiding interests which lead to centering attention and effort along some particular lines. Greatest achievement seems to be dependent upon the individual's having a strong abiding interest in the work he is doing. We need not, however, expect the child to have such a narrowed, intense, and relatively permanent interest along some line. He may show a very intense interest in some one thing for a short time and then turn with equal intensity to something else, or he may show much interest in several things simultaneously. During childhood cultivating and developing a wealth of wholesome interests should be an objective of child guidance and control by both parent and teacher.

Relation of Interest to Aptitude and Maturity. We have discussed this problem at some length elsewhere¹⁴ and need give only a brief statement here. Investigation seems to lend support to the common-sense view that the child having ability in a given thing is likely to have more interest in it than he would in something in which he has little ability, and more interest in it than another child having less ability in it, other things in both cases being equal. Of course, if other things are not equal, they may overcome or outweigh the interest-producing effect of his ability. If, for example, a child does have considerable ability to do something but his experiences with it are loaded negatively with strong emotion, he may have little genuine interest in it. If an incompetent or disagreeable teacher introduces the child to some subject in school, he may have a resultant dislike for it, although he really may have considerable ability in it. Aside from the effect of such irrelevant, unfavorable elements, it seems reasonably well established that interest may be taken as some evidence of ability, provided the child actually has had some vital experience of the thing in question. We do not regard as evidence of interest a mere idle

¹⁴ *Psychology of Adolescence*, pp. 284 ff. See also Freyer, *The Measurement of Interests in Relation to Human Adjustment*, chaps. 6 and 7.

wish to do something, or a desire to do it which is the result of social pressure. The sense in which we use the term requires that it be genuine interest, as defined in the first part of this section — active, objective, and personal.

Changes in interests are partly dependent upon maturation, as may be seen in the case of children's play interests. The ten-year-old's play activities are different from those of the four-year-old, not necessarily because he has had so much experience with them that he is surfeited by them, but rather because they were suited to a degree of development which he has long since passed. The reading interests of children also vary with age because of differences in maturity, in intelligence, in outlook, and in experience. Undoubtedly, maturation is a factor in moulding children's interests along many other lines.

*Children's Recreational and Social Interests.*¹⁵ The play activities of children give valuable clues to the child's nature and needs. In infancy his interests are centered upon manipulating the simple toys and other objects in his hands — squeezing, pushing, pulling, or striking them upon the table, crib, or high-chair, or attempting to put them in his mouth. The diffuse and random nature of such activities has been reported frequently. By the age of three or four years we find more varied play activities. Playing with toys in the sand pile, building houses with blocks, riding kiddie cars, playing with toy automobiles and wagons, playing house, playing train, playing with dolls, riding tricycle, etc., may be observed. At the age of five years play interests still center about games and activities which are largely individual and solitary, and do not require the participation or cooperation of other children. Jumping, climbing, running, sliding, digging, throwing, lifting, and rolling are whole-body activities performed without any motive of doing one's best or of doing better than someone else. The presence of another child may be resented, and if he has some plaything, a struggle for its possession may ensue. As we see in Chapter XIII, children at this age may play in small

¹⁵ Chapter XIII, on the "Social Development of Children," treats certain features of changing social interests.

groups, but often they really are not playing in groups, they are merely near each other while playing. They resemble Sir Francis Galton's ox which was restless when separated from the herd, but once in the herd went on feeding, apparently oblivious of the rest of the herd — gregarious but not social. The directed play activities of the kindergarten often involve ring games, rhythmic movement, and singing games. The five-year-old is likely to enjoy construction work. If he is given some direction and if tools are available, he will try to make crude objects, using saw and hammer. Play interests at this age are characterized by the child's engaging in the activity from sheer enjoyment of it, and not to acquire any skill. With further increases of age, the nature of his play interests again changes. By the age of ten or eleven marked differences are seen. The free individual play activities without rules and competition have been displaced by games with rules and with some object or goal. Such games are likely to be largely competitive, with much rivalry in the case of boys. Interest centers on skill and excellence. The games run a definite course, that is, they have a beginning and come to an end. Little cooperation is found. In fact the adult who gets together a group of ten-year-old boys for a baseball or football team is likely to have a surplus of would-be pitchers, first-basemen, quarterbacks, and centers, but a dearth of fielders and players who do not carry the ball. Emphasis upon speed, strength, and accuracy is characteristic of the play activities of the boy at ten. He is much interested in excelling the others in running, throwing, and the like. Using tools to make things, engaging in bicycle-riding, climbing trees, skating, swimming, camping out, and playing with various kinds of mechanical devices are also much enjoyed. Among girls of ten years, doll play has begun to decline (see Fig. 124) and in the next three years will almost disappear. Playing with paper dolls, making clothes for dolls, participating in various kinds of table games, bicycle-riding, playing on the horizontal bar, house-keeping activities, puzzles, dancing, and dramatic games are common among girls of ten or eleven years.

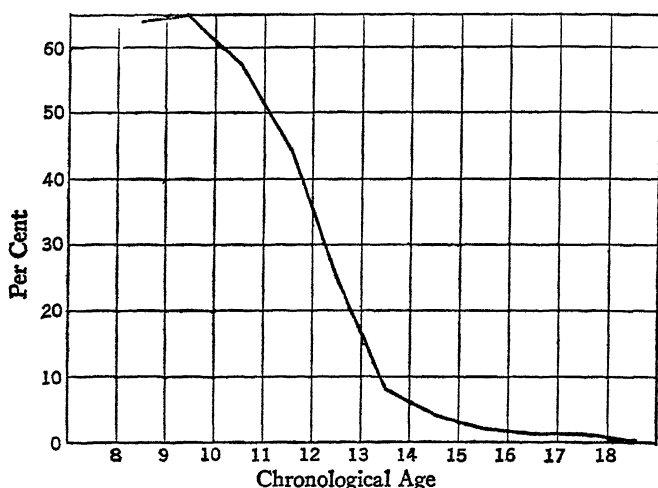


FIG. 124. PERCENTAGE OF GIRLS AT VARIOUS AGES PLAYING WITH DOLLS, DOLL CLOTHES, DOLL CARRIAGES, ETC

(Lehman) During one week preceding a given investigation. Determined from answers to a check list. $N = 2352$.

Some of the most frequently reported play activities of children are given in Table 14, which shows the typical preferences of boys and girls who are five, eight, eleven, and fourteen years old. These data, taken from Lehman and Witty,¹⁶ were gathered by play questionnaires submitted to more than twenty-six thousand persons ranging in age from five to twenty-two years. Not only age differences, but significant sex differences may be discovered in these reports, especially between the older boys and girls.

A conspicuous change in recreational activities is suggested by the percentages of children, at each age up to fifteen, attending the movies, climbing trees, porches, and fences, riding bicycles, and playing marbles, as shown in Figs. 125-128.

At twelve years of age, two-thirds of the town boys and three-fifths of the town girls attend motion pictures. Nearly half of the eight- and nine-year-old town children also attend. These proportions are in distinct contrast with the smaller

¹⁶ *The Psychology of Play Activities*. Copyright, 1927, by A. S. Barnes & Co., New York.

TABLE 14. THE TEN BEST-LIKED PLAY ACTIVITIES AT AGES FIVE, EIGHT, ELEVEN, AND FOURTEEN

(Lehman and Witty)

Boys	Girls
<i>Five Years</i>	
Playing with a ball	Playing house
Playing with blocks	Playing with dolls
Playing with a wagon	Playing with a ball
Playing house	Playing school
Playing horse	Drawing
Playing hide-and-seek	Playing mulberry bush
Playing tag	Playing with blocks
Drawing	Skipping
Playing school	Making things
Playing in a sand pile	Jumping rope
<i>Eight Years</i>	
Playing football	Roller skating
Playing baseball (with hard ball)	Playing with dolls, doll carriages, doll clothes, etc.
Boxing	Riding in an automobile
Playing basketball	Going to movies
Playing marbles	Reading books
Just playing catch	Playing piano for fun
Playing cowboy	Playing school
Roller skating	Looking at Sunday "funny" paper
Looking at Sunday "funny" paper	Playing jacks
Wrestling	Playing house
<i>Eleven Years</i>	
Playing football	Going to the movies
Playing baseball (with hard ball)	Reading books
Playing basketball	Playing piano for fun
Roller skating	Looking at Sunday "funny" paper
Just playing catch	Roller skating
Riding a bicycle	Riding in an automobile
Going to the movies	Playing with dolls, doll carriages, doll clothes, etc.
Boxing	Playing basketball
High jumping	Going to parties or picnics
Pole vaulting	Listening to the Victrola
<i>Fourteen Years</i>	
Playing basketball	Going to the movies
Playing football	Reading books
Playing baseball (with hard ball)	Social dancing
Driving an automobile	Playing piano for fun
Going to the movies	Riding in an automobile
Riding a bicycle	Going to parties or picnics
Hunting	Watching athletic sports
Riding in an automobile	Having "dates"
Playing tennis	Playing basketball
Boxing	Doing gymnasium work

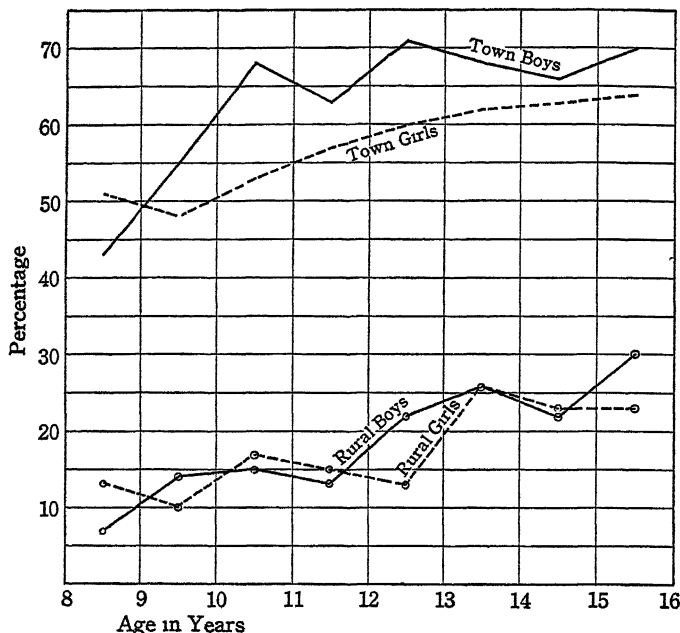


FIG. 125. PERCENTAGE OF TOWN AND RURAL CHILDREN ATTENDING THE MOVIES IN ONE WEEK
(Lehman and Witty.)

percentages who engage in climbing, play marbles, skip rope, etc. The total number of play activities reported tends to decline after the tenth year as Fig. 129 indicates.

The environment plays an important rôle in the development of play activities, as we would expect. An examination of Figs. 125-128 reveals certain differences between the play activities of town and country children.¹⁷ The smaller groups of children available probably account in part for the fact that rural children play games involving less organization and teamwork. Another factor is the wider range of ages constituting a typical rural group, which necessitates playing games simple enough for even the younger children to understand. Approximately seven per cent of the town children, ages ten to fifteen,

¹⁷ See Lehman and Witty, *op. cit.*, chap. 8.

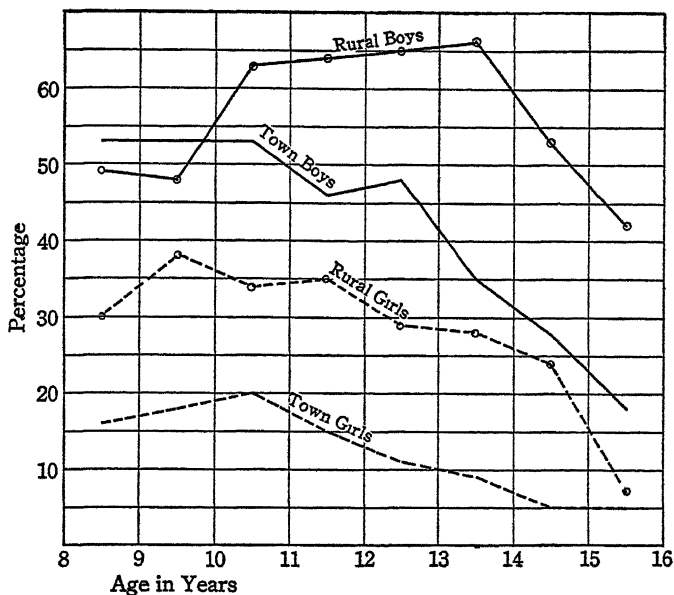


FIG 126. PERCENTAGE OF TOWN AND RURAL CHILDREN WHO CLIMBED PORCHES, TREES, FENCES, ETC., IN ONE WEEK
(Lehman and Witty)

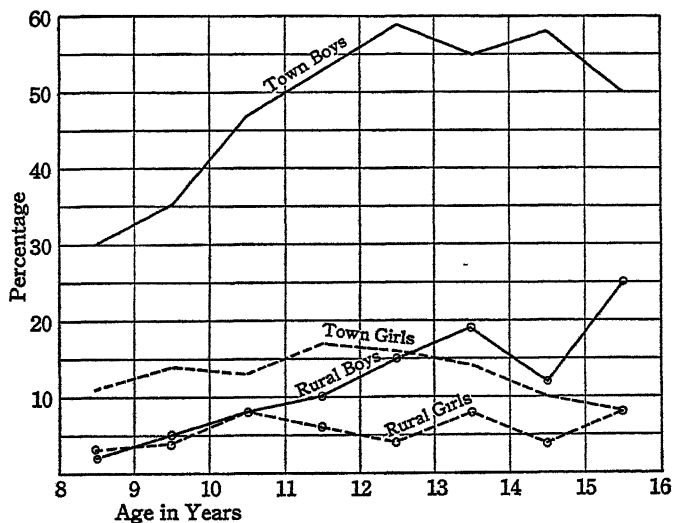


FIG. 127. PERCENTAGE OF TOWN AND RURAL CHILDREN RIDING BICYCLES IN ONE WEEK

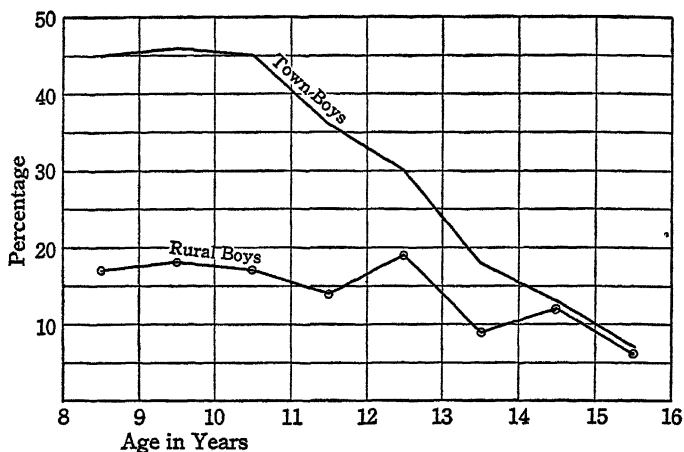


FIG. 128. PERCENTAGE OF TOWN AND RURAL BOYS PLAYING MARBLES
IN ONE WEEK
(Lehman and Witty)

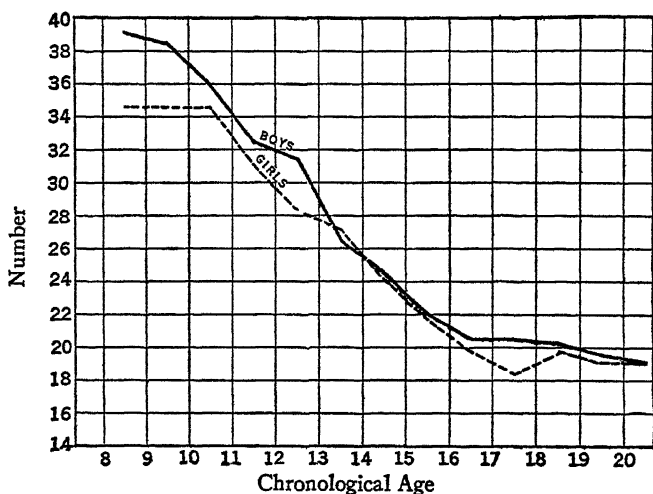


FIG. 129. NUMBER OF PLAY ACTIVITIES ENGAGED IN DURING ONE WEEK
(Lehman.) Determined from answers to a
check list. $N = 6359$ boys, and 7373 girls.

played "Blackman," while forty-one per cent of the country children played this simple game. One-tenth of the town children at ages ten to fifteen played "teeter-totter," but more than a third of the rural children did so. More than three times as many city children as rural children, ages eight to fifteen, went to the movies each week. At each age, however, the proportion of rural boys and girls engaging in climbing activities is much greater than that of the town boys and girls. The environment facilitates participation in some play activities and limits it in others, as we would expect. In all of these play problems is found the customary wide range of individual differences. Many play activities indicate the development of social interests, the most noteworthy examples being found among the data on fourteen-year-olds in Table 14. Girls' interests include social dancing, picnics, parties, and "dates," while boys' interests are in football, baseball, and basketball, all of which involve cooperation or teamwork.

*The Reading Interests of Children.*¹⁸ The types of literature that children like to read, and the amounts that they read, must be known in order to understand the forces which shape their behavior. Through reading the child secures information, develops appreciations, attitudes, and ideals, and lives vicariously.

The amount read by children varies with their age, intelligence, and environment. Children who have just entered school do not read books. As soon as some facility in reading has developed, however, they do read a few books. At ages eight to twelve, one or two books per month are read under favorable conditions, with a slight increase during the next two years. Often the peak is reached at the age of thirteen or fourteen years, possibly because of the fact that high-school studies and other interests take more of the child's time. The brighter

¹⁸ Many investigations of children's reading interests have been made. The following references will give an introduction to this material: Celestine, *A Survey of the Literature on the Reading Interests of Children of the Elementary Grades*, Gates, *Interest and Ability in Reading*; Huber, Bruner, and Curry, *Children's Interests in Poetry*, Jordan, *Children's Interests in Reading*; Terman and Lima, *Children's Reading*; Uhl, *The Materials of Reading*.

children tend to read at an earlier age, to spend more hours per week in reading, and to read more books than children of average or below average mental ability. Terman regards the ability and desire to learn to read at an early age as a characteristic difference between bright and average or dull children. Children from homes in which much reading is done, or in which many suitable books are available, are likely to read more than children who are not thus favorably situated. When children come from homes which do not stimulate them to read, the school has an added responsibility in influencing them to read suitable books from the school library and the public library.²⁹

The types of literature read and enjoyed by children also vary with age. If the student will note the book being read by an eight-year-old, that being read by a ten-year-old, and that read by the child of twelve or thirteen years, he will see certain typical differences between them. More comprehensive studies are needed, however, to show reliably the changes that do take place. Up to the age of five years, children enjoy listening to simple narrative stories of animals and of other children. They like to look at picture books, and to learn jingles and nursery rhymes. At the ages of six and seven years, Mother Goose rhymes, picture books, and nature stories, especially the latter, are liked best. Some time about the eighth or ninth year, interest in fairy stories becomes strong. Soon thereafter strong interests develop in books of travel and biographical stories. Boys of ten or eleven are likely also to show some interest in mechanics and invention. Tales of adventure and mystery are enjoyed from the eleventh year. Interest in science increases after this year, whereas nature and animal stories are not so popular. Girls at ten and eleven years still enjoy stories of home and school life and fairy tales. By the age of twelve or thirteen, interest is found in biographies and historical narratives. Girls, however, show some interest in

²⁹ The public library staff in the smaller cities and towns is usually quite willing, but not especially well qualified, to help direct children's reading. It would seem a good investment and sound civic policy for communities to employ as librarians only persons whose culture and special training for library work are likely to insure the needed effectiveness of this important agency for child and adult education.

adult fiction. From fourteen to sixteen, sex differences in reading interests become more marked. Boys are greatly interested in science, athletics, mechanics, invention, and the radio, as well as in adventure stories. Girls' dominant interests center chiefly in adult fiction, adventure, and, in diminishing degree, in juvenile fiction.²⁰

Children's reading interests by grade are shown in another study²¹ as follows:

- Grade I, Animals and play;
- Grade II, Lullabies;
- Grade III, Outdoors and fairies;
- Grade IV, Humor and nonsense;
- Grade V, Heroes;
- Grade VI, Home and danger.

Studies of this type do not imply that, for example, children in the fourth grade like only humor and nonsense and should have only this kind of reading. Rather do the researches mean that such types of reading materials are likely, on the average, to be enjoyed most at this time. Boys of greater mental ability read a larger percentage of books on science, history, and biography. Girls of high intellectual ability seemed to have less interest in emotional fiction. Hollingworth²² has shown that gifted children like dictionaries, atlases, and encyclopedias, and that they prefer detective stories to crude adventure.

Pressey²³ has suggested that interests in both reading and motion pictures are directed in part by some wish-fulfillment motive. In them, the child sees what he would like to be, but cannot achieve. We are inclined to believe that vicarious living and wish-fulfillment through reading and attending the

²⁰ That environmental and other factors are potent in causing age differences may be seen by comparing the results of the studies of Jordan and of Terman and Lima. Selection probably is an additional differentiating factor. At any rate, according to the former, 25 per cent of the girls at fourteen to sixteen enjoy adventure stories, whereas, according to the latter, at age fourteen girls read an adventure story only occasionally.

²¹ Huber, Bruner, and Curry, *op. cit.*

²² *Gifted Children, Their Nature and Nurture*, p. 139.

²³ *Psychology and the New Education*, p. 85.

motion pictures have a greater significance for the child's development than is generally recognized. By noting the qualities depicted in the literature and moving pictures liked by children we have valuable clues to understanding their needs and desires. Boys at ten to thirteen admire physical strength, courage, skill, self-control, loyalty, gaining the plaudits of their fellows, being trustworthy, fair, and honest. With greater maturity these traits continue to be admired, but the romantic element is likely to make its appearance. Girls at ten to thirteen admire unselfishness, protecting weaker children, kindness to others, holding high social position, honesty, and friendliness. With adolescence the hero of her desire is attractive and possesses other personal characteristics which bring success in the world of romance.

Children's Interests in Motion Pictures. Recent investigations²⁴ have shown the kinds of motion pictures enjoyed by children of various ages. Younger boys like adventure stories, western thrillers, and comedies. Younger girls also like adventure, comedies, and western thrillers, but they also have some interest in romance. With older boys and girls, these same qualities are much enjoyed, but romance and plot are more to the fore. With older girls the order of preference is romance, comedy, and western thriller. Obviously much the same qualities have appeal as in the child's play and reading activities. Since the majority of children in towns and cities attend motion pictures, the problems of guidance and control in this respect assume considerable magnitude.

*Vocational Interests of Children Before Puberty.*²⁵ Children's vocational interests at the earlier ages have little significance for their actual adult choices, or for their vocational aptitudes. They are essentially another indication of children's interests. The small boy wants to be a policeman, fireman, chauffeur, soldier, bandman, or usher, because he is attracted by the

²⁴ For detailed information on this subject, see Jones and Conrad, in *Journal of Social Psychology*, vol. 1, pp. 419-423; Mitchell, *Children and the Movies*; and Seagoe, in *Journal of Juvenile Research*, vol. 15, pp. 169-180.

²⁵ Cf. Freyer, *The Measurement of Interests in Relation to Human Adjustment*.

bright uniform, the noise, the activity, or the great importance of such personages. A little later other interests arise. He is interested in making things or in mechanics and decides to be a carpenter or an engineer. Through hero-worship, imitation of his father or of some other acquaintance, or through observation of their vocational activities, he may decide to become a grocer, lawyer, minister, physician, or merchant. With greater maturity and experience the adolescent's approach to vocational choice becomes more significant, as we have shown elsewhere.²⁶ Young girls' vocational interests often have a narrower range than boys' because of the limitations placed upon them by conventions, and by the social approval and disapproval of their family or friends. Teaching, dramatics, nursing, clerking in the ten-cent store, or being a waitress in a restaurant may make their appeal. But with age and with the maturity and experience age brings, the girl is more critical in her evaluations and choice. Her vocational interests are modified. Secretarial work, stenography, typing, department store salesmanship, millinery, and various other interests are added.

Laws and Principles for Developing Interests. Wholesome interests are developed according to the same laws and principles as condition other modifications of behavior. As we have shown elsewhere,²⁷ in developing a wide range of wholesome interests three general considerations are especially applicable: (1) The child should be in vigorous contact with the activities in which the development of interests is desired, preferably through active participation in them. (2) The activities should be proportionate to his abilities or appropriate to his level of development so that he can engage in them with some effectiveness. He is not likely to have a genuine interest in things which are too old for him or are beyond his powers. (3) The conditions under which he has contact with the activities or engages in them should be such as to insure satisfaction. Compulsion is likely to be less effective than procedures which

²⁶ *Psychology of Adolescence*, pp. 298 ff.

²⁷ *Ibid.*, pp. 304-307.

emphasize the attractiveness of the activity, or its necessity to meet some need.

SELECTED REFERENCES

On the meaning and importance of motivation, see Dashiell, *Fundamentals of Objective Psychology*, chap. 9; Dockeray, *General Psychology* (revised), chaps. 11, 12, Fernberger, *Elementary General Psychology*, chap. 20; Gates, *Psychology for Students of Education* (revised), chap. 6; Murphy, *A Briefer General Psychology*, chap. 4; Shaffer, *Psychology of Adjustment*, chap. 4; Thomson, in *Educational Psychology* (edited by Skinner), chap. 7; Trow, *Educational Psychology*, chap. 2; Woodworth, *Psychology* (3d edition), chap. 12.

On motivation and interests of children, see Anderson and Smith, in *Journal of Experimental Education*, vol. 2 (1933-34), pp. 138-160; Blatz and Bott, *Parents and the Pre-School Child*, Part I, chap. 2, Huber, Bruner, and Curry, *Children's Interests in Poetry*; Terman and Lima, *Children's Reading*.

See also the references at the end of this volume.

CHAPTER XIII

SOCIAL DEVELOPMENT OF CHILDREN

THE newborn child is neither a social nor an unsocial being. He is a highly complex organism equipped to respond to certain sorts of stimulations, as has been seen throughout the discussion of infant behavior. He also possesses a high degree of modifiability and significant potentialities for future growth and development. How soon after birth, then, does the child first show evidences of social behavior, of responding to the presence or activities of other persons? What are some of his earliest social responses? What particular kinds of stimulations evoke them? How do infants respond to the presence of other infants? What development of social behavior occurs during infancy and the pre-school years? During the years from six to twelve? What are the causes and significance of conflicts between children? What factors influence the child's social development? What is the significance of social approval, self-assertion, language development, gregariousness, and other elements upon the development of social behavior during the first dozen years of life? These are some of the important problems whose answers now concern us.

I. THE SOCIAL RESPONSES OF INFANTS

Although the infant is non-social at birth, he cannot remain so for a very long time. He lives in a society and is constantly dependent upon other people for his welfare and comforts. Accordingly, the infant soon learns to make responses to other persons. As he grows from infancy to childhood, these social adjustments become even more evident.

The Learning of Social Behavior. The earliest social behavior of infants arises from the care and handling given to them by adults. When a baby is fed, dried, kept warm or petted, he re-

sponds by behavior that may be taken to indicate satisfaction. If he is restless or crying, this agitated behavior ceases. With a little greater maturity, positive evidences of pleasure are apparent in the forms of smiling, gurgling, cooing, laughing, and reaching with the arms. Fundamentally, all social behavior is based on these responses to the satisfaction of the infant's bodily needs.

During the early months of life, learning takes place by which these reactions come to be made to persons, rather than only to the actual bodily stimulations. This learning is an example of the operation of the conditioned reaction. Since the mother or nurse or some other adult is always present when these ameliorative satisfactions are administered, the sight, sound, or other symbol of these persons becomes capable of evoking the response. The beginning of social behavior in infants is dependent upon the development of their abilities of perception and discrimination and upon the occurrence of experiences through which they may learn.

Earliest Social Stimulations and Responses. Since normal infants become able to perceive objects in the environment at about the same time and since all have the fundamental experiences basic to social behavior, a typical sequence of the development of social responses can be described. Some conditioned social responses have been reported during the first month of life. Infants of this age sometimes stop crying when someone speaks, when someone enters the room, or even at the sight of a human face. Although these reactions seem to be responses to the presence of people, caution is necessary in interpreting them in individual instances. Very young infants often stop crying when any stimulus arouses their attention. If something touches him, if any noise or movement occurs, or if he merely relieves his own discomfort by turning to a less cramped position, the same response may be made. Some responses of infants to persons, then, are really social, while in other cases the infant reacts to the person only as a mechanical agent.

By the second month, social responses to persons are more

clearly distinguishable. Studies by Bühler,¹ Gesell,² and others indicate that by the middle of the second month, the child will often smile when some familiar person is seen. At the age of two full months, many infants will turn the head and eyes toward the sound of a human voice. These responses, of course, do not develop because of any inner social tendency, but are evidences of learned behavior.

The Recognition of Facial and Vocal Expressions. During the first two months of postnatal life the infant's smile at the presence of another human being is not dependent upon the latter's facial expression or tone of voice. The young human is not yet able to differentiate such relatively simple things as smiling and angry facial expressions, or kind and scolding words and tone. If a person bends over the crib of a two-months-old infant and has a "smiling countenance," the infant may smile in return. But if the adult has an angry expression, the infant also may smile. The infant even at the age of three or four months probably is unable to differentiate kind and angry looks, tones or gestures, although exceptions occur. From the close of the fourth month, however, infants show distinct signs of differentiating expressions and by the fifth month may cry at the scolding voice and threatening gesture. The child by this time has developed his powers of attention and observation to such an extent that he can watch the face and note any changes in its details. He also is capable of discriminating differences in tone of voice. Perhaps even more important is the fact that he has now learned that kindly expressions typically accompany satisfying ministrations to his needs, while harsh ones imply neglect or even painful punishment. Before the end of the first year he has made a great deal of progress in understanding vocal and facial expressions. Bühler and Hetzer³ believe that children at the ages of eight to twelve months understand the unfriendly grimace, angry tone, or menacing gesture. Often, however, they regard such an expression as

¹ *The First Year of Life.*

² *Mental Growth of the Pre-School Child.*

³ *Zeitschrift für Psychologie*, vol. 107, pp. 50-61.

a joke or play, and after the initial hesitancy they laugh and give other sounds of pleasure.

Other Social Responses During Infancy. The infant makes other responses which are indicative of very simple social behavior. Upon the approach of a familiar person the four-months-old infant very often raises his arms and stiffens his body slightly in anticipation of being lifted. He also shows some delight upon the approach of the familiar person. Of course, some infants make these responses earlier, but by the age of four months the majority are likely to do so. As we have already seen (Chapter VIII), infants of this age have some remembrance of events and often seem to look for a face that has disappeared, gazing for some little time toward the place they last saw it. Sometimes infants of four months chuckle or laugh when familiar persons resort to certain playful activities. A month or two later many infants show greater development of social behavior, and respond to other social stimulations. For example, Washburn ⁴ found that some infants would laugh when, in play, another person's head was suddenly hid or revealed as in a game of peek-a-boo. With the development of motor skill, adaptive behavior, attention, discrimination, and language, the infant increases not only the scope of his responses to the presence and activities of other persons, but also the number and types of social situations to which he can respond.

How Infants Respond to the Presence of Other Infants. Babies at four and five months of age frequently seem to be unaware of each other's presence, even though near each other. By the age of six months, however, they actively look around and attract each other's attention. Thus, the infant of six or seven months may touch another one who is near, or he may coo, or hinder the other's activities in some way. We have observed a few babies of five to eight months, placing them two at a time near each other on a bed or couch. The older ones showed distinct evidence of being aware of the presence of each other. Thus, an eight-months-old infant when placed near one of five months reached out and stroked the younger one and then took

⁴ *Genetic Psychology Monographs*, vol. 6, pp. 397-537.

hold of her arm, cooing, gurgling, and smiling. The younger infant had given no previous sign of seeing the other and was cooing contentedly. Upon being touched, she stopped cooing, turned her head, and looked at the other baby. She did not, however, put out her hand and try to touch the older one. Responses to the presence and activities of adults and older children are observable at an earlier age than are responses to other infants of about the same age, undoubtedly because the former provide more adequate stimuli. Tables 15 and 16 give the results of Bühler's observations concerning the responses of infants to adults and to other infants.

Varieties of Social Behavior Observed in Infancy. During the second half-year of postnatal life infants' social behavior shows considerable diversity. According to one classification⁵ infants were designated as *socially blind*, *socially dependent*, and *socially independent*. The behavior of some infants seemed to be uninfluenced by the presence or activities of other infants.

TABLE 15. RESPONSES OF INFANTS TO ADULTS, OBSERVED IN SIXTY PER CENT OR MORE OF THE CASES
(Bühler)

	AGE IN MONTHS
Returns glance of adult with smiling	1 to 2
Is quieted by touching	1 to 2
Cries when adult who was attending him leaves	2 to 3
Smiles back at adult	2 to 3
Disturbed when approached	2 to 3
Returns approaching glance with "talking"	3 to 4
Displeasure when loses glance of adult	3 to 4
Quieted by caressing	4 to 5
Disturbed by the sight of people	4 to 5
Striving for attention by "talking"	7 to 8
Stretches out hands toward adults	7 to 8
Cries when adult stops talking	7 to 8
Strives for attention by movements	8 to 9
Pulls on the clothes of adult	9 to 10
Offers adult an object	9 to 10
Imitates movements of adult with a plaything	9 to 10
Organized play activity	10 to 11

⁵ Bühler, Charlotte, *Proceedings and Papers of the Ninth International Congress of Psychology*, pp. 99-102.

TABLE 16 RESPONSES OF INFANTS TO OTHER INFANTS, OBSERVED
IN SIXTY PER CENT OR MORE OF THE CASES
(Buhler)

	AGE IN MONTHS
Observes other child	4 to 5
Smiles at other child	4 to 5
Cries if other child receives attention	8 to 9
Offers toy to other child	8 to 9
"Lalls" to other child	8 to 9
Imitates movements of another child	9 to 10
Opposes toy being taken away	9 to 10
Organized play activity	10 to 11
Strives for attention by means of "lalling"	10 to 11
Ill-humor if another child moves away	10 to 11
Setting aside toy and turning toward another child	11 to 12

If they noticed them, it was with no interest or emotion. Even the others' movements were of no interest. Such infants played, moved about, cooed, and smiled without any interest or regard for the presence of other infants who were near. Such behavior may be regarded as exhibiting social blindness. The infants who were not socially "blind," that is, those who paid attention to the behavior of others, exhibited varying degrees of independence in social relations. At one extreme some showed a high degree of social dependence. They were much influenced by the presence and activities of other infants. At the other extreme were infants who, equally aware of the presence and activities of others, still showed a great deal of social independence. The socially dependent infant's behavior seemed to be conditioned largely by that of another. He usually copied it or he may merely have watched it. Or if he was not so timid or if his responses were not so readily inhibited, he might go through his little repertory of stunts trying to arouse or please the other. The socially independent infant was aware of the presence of the other and responded to him and his behavior, but did not seem to be dependent upon him. He played with him but was clearly the leader, not being afraid of or intimidated by the other. Children from six months to eighteen months of age possess these characteristics in greater

or less degree. Bühler believed that they show them without reference to previous contacts with others, to their being only children, to the home conditions, or to nationality. We may have here early evidence of dominance and submission.

Any reference to infants as socially dependent or socially independent, however, must not be applied too rigidly. We must not think of all children who are not "socially blind" as belonging at either of these other two extremes. Some do belong to the first class and some to the second. Many, however, seem to fall into groupings between the extremes, especially as they pass from infancy to the pre-school and school years. As characterizations of general social attitudes of individuals, Bühler's classes are suggestive and valuable because they throw into clear relief important considerations in the social development of the child. No scheme of classifying children into two or three "types" is satisfactory, however, as is seen in connection with the discussion of child personalities.

2. SOCIAL BEHAVIOR OF PRE-SCHOOL CHILDREN

As the child passes from infancy to the pre-school years, his social development becomes increasingly more noticeable, extensive, and complex, paralleling his growth and development along other lines. In fact, maturation and learning in general are important factors contributing to his social development.

Measuring the Social Development of Pre-School Children: the Bridges Scale. Research in the social development of pre-school children is facilitated by the use of a scale for measurement, which enables social behavior to be expressed in quantitative terms. The Bridges social development scale is not a carefully calibrated scale, such as is being sought for the measurement of intelligence, but is a "research method for the study of children's social behavior." The scale is designed for use with children from two to five years of age. It consists of two sections — relations with children, and relations with adults, containing fifty and thirty-five items, respectively. Those which have proved to be most significant are marked

with an asterisk. The first thirty items, on relations with children, are reproduced here to show the nature of the scale.

RELATIONS WITH CHILDREN ⁶

The child has or has not:

1. Played with another child
2. Spoken to another child
3. Occasionally made social contact by touching or pushing a child
4. Imitated other children's actions
5. Imitated children's words
6. Imitated children's laughter
- *7. Often spoken to other children
- *8. Originated new play activity with another child
- *9. Joined group of children in play
- *10. Sought another child's approval
- *11. Asked another child for help
- *12. Always given up toys at fair request
13. Usually waited turn
14. Tried to defend own right to materials or place
- *15. Pointed to others' errors
- *16. Tried to help others
- *17. Stopped work to aid another child
- *18. Comforted another in distress

The child has not or has:

19. Turned away to avoid another child's friendly advances
- *20. Usually stayed out of group marching or games
- *21. Claimed others' toys
- *22. Interfered with others' work
23. Destroyed others' work
- *24. Created disorder in group or led others into mischief
- *25. Frequently pulled or pushed others
26. Frequently complained of others to adult for own gain
27. Harassed new child by scoffing or shunning
28. Hit or pinched others for fun several times
29. Bitten or spit at others for fun
30. Teased in other ways causing irritation or discomfort

An observer who has watched a child's behavior daily for some time and who has made preliminary notes on it, rates

⁶ Bridges, K. M. B., *Social and Emotional Development of the Pre-School Child*, pp. 37-38. London, Kegan Paul, Trench, Trübner & Co., Ltd. Quoted by special arrangement with the publishers.

the child on the scale. Each item to which the first alternative applies ("has" for items 1 to 18, "has not" for items 19 to 30) is marked "1." If the second alternative is true, the item is marked "0." Those items of which the examiner is not sure, or those which cannot be observed, are marked "-." The score is the percentage that the items marked "1" is of the total items marked either "1" or "0." The unobserved items are not counted in arriving at this score. In other words:

$$\text{Score} = \frac{\text{No. of items marked "1," times 100}}{\text{No. of items on test, minus those marked "-"}}$$

The quantitative scores assist in making comparisons between children or between groups who have had different training or experiences. In addition, the qualitative use of the Bridges scale has value in giving a diagnostic account of the pre-school child's social development, so that appropriate treatment may be given, should undesirable developmental trends appear.

From the Bridges scale, it appears that as the child passes through the pre-school years he comes to take on certain more mature patterns of behavior, such as speaking to another child, joining a group of children in play, asking another child for help, waiting his own turn, defending his own right to materials or place, comforting another child in distress, not avoiding another child's friendly advances, not destroying another's work, not hitting or pinching others for fun, willingly sharing his own toys or candy brought to school, defending rights of smaller children, initiating group activities, and trying to make a new child one of the group. He will not consistently show that he has given up immature patterns. He may continue from time to time to tease, pinch or hit others for the fun of it, but socially undesirable behavior normally is eliminated and the more approved responses made habitual.

Interpretation of Facial Expressions. The early recognition of certain facial and vocal expressions, such as smiling or angry looks and kind or scolding tones, found among infants from the fifth month on, is an important step in understanding the be

TABLE 17. PERCENTAGE OF CHILDREN, AGES THREE TO FOURTEEN YEARS, CORRECTLY JUDGING EMOTIONS FROM PHOTOGRAPHS

(G. S. Gates, in *Journal of Educational Psychology*, vol 14, p 460)

AGE	No OF CASES	PERCENTAGE CORRECT FOR PHOTOGRAPH SHOWING					
		Joy	Pain	Anger	Fear	Scorn	Surprise
3	10	70	40	30	00	00	10
4	40	70	40	40	05	00	00
5	85	84	44	29	13	00	00
6	59	89	60	40	17	02	02
7	55	94	72	52	10	04	00
8	58	90	43	61	32	08	00
9	39	95	64	72	46	10	05
10	28	100	64	82	57	42	04
11	44	98	79	82	77	43	57
12	27	100	74	93	89	41	52
13	17	100	77	65	59	18	41
14	8	100	100	87	75	25	75

havior of human beings. We find children showing greater skill along this line as they get older. In one study⁷ children from three to fourteen years of age were shown a series of photographs of a woman whose facial expressions were meant to represent anger, fear, surprise, scorn, pain, and joy. More than 70 per cent of the kindergarten children recognized laughter, whereas less than 50 per cent of them recognized fear, anger, or pain. By the age of seven years more than half recognized anger, by eleven, more than half recognized surprise. These results are given in Table 17. The course of development may be seen also in the fact that the average number of photographs correctly named was 1.5 at the age of three years, and nearly four and one-half at the age of eleven. Of course, this test is somewhat artificial because actual facial expressions are mobile or changing rather than fixed or static. Accordingly, we must not conclude that children cannot recognize fear, anger, and pain in a familiar person's behavior until the ages shown in the foregoing study. The addition of vocal expressions is a distinct supplementary aid to the child in identifying the emotional states of a familiar person.

⁷ Gates, in *Journal of Educational Psychology*, vol. 14, pp. 449-462.

Laughter and Crying of the Pre-School Child. The laughter and crying of children under five years of age have significance in studying their social development. Apparently,⁸ more of the two-year-old's laughter takes place when he is unaware of another child's presence and is playing by himself. At a later age, however, the most laughter seems to occur when children are in social contact with other children. Boys, according to Brackett's study, seem to laugh most and cry most when with boys. In the latter case, the teasing or amusing nature of the social contact may be a contributing factor.

The Formation of Friendships During the First Five Years. As nearly as can be told from the available evidence, children are naturally neither friendly nor unfriendly. Friendliness is the outcome of environmental forces, as is also unfriendliness. The meaning of anything to a child is the result of his experiences with it, determined by what it does to or for him, and by what he can do to it. In this respect, people are merely objects in the child's environment. What they mean to him follows directly from his experiences with them. Under one kind of environment he will become friendly, under another, unfriendly. The majority of children spend their early years in homes in which people care for their needs. They are fed, clothed, and comforted, their pain is relieved, and many other things that make for their well-being, happiness, and contentment are performed. Accordingly, we would expect the majority of young children to be friendly rather than unfriendly. A study⁹ of two-year-olds shows this to be the case. They were brought into a small playroom two at a time, each child being paired with each other child of the group, and their responses were recorded. The results showed that friendliness was far more common than unfriendliness — in terms of score, 89.5 and 20.5, respectively. If children's early experiences with people were marked by abuse, pain, and the like, unfriendliness undoubtedly would be developed instead.

Obviously, the factors which further the formation of friend-

⁸ Brackett, in *Journal of Experimental Education*, vol. 2, pp. 119-126.

⁹ Mengert, in *Journal of Genetic Psychology*, vol. 39, pp. 393-398.

ships in childhood are those which satisfy, please, comfort, or help the child in some way. Factors which hinder or prevent the formation of friendships are those which irritate, anger, pain, or otherwise displease the child. A very long list of specific conditions tending to develop friendliness could be given, and another list conducive to unfriendliness could be set forth. The close contacts incident to living in the same family may lead to bitter hatred or warm affection. If children interfere with each other in any way continually for a considerable period of time, they are likely to become unfriendly and jealous of each other. With young children proximity is a very common factor in friendship and companionship. The child cannot go far from home. Accordingly, he makes friends with children near at hand. Mere propinquity may not be enough to develop companionship, but if the children are near the same age, they are likely to have enough community of interest to become friends. At all ages, it would seem, community of interest is a very important factor conditioning friendship. Children who like to do the same things are likely to be friends, if they have the opportunity to be together so as to discuss their common likes, provided, of course, that other conditions giving rise to friction are absent.

When pre-school children are allowed to form groups freely, sex plays less of a part than with older children who tend to group themselves according to sex. Children, if left to themselves, form groups largely upon the basis of acceptable behavior and ability to enter into the group activities. When race, color, poverty, or riches are factors in the formation of groups of pre-school children, we may be sure that home pressure or the influence of other adults is likely to be responsible for the social discrimination displayed. Such factors otherwise have little meaning or value for the child of four or five years.

A youngster of three or four years of age often forms a strong attachment for some other child and seeks to be with him as much as possible. Such little chums may be seen going home together from nursery school or kindergarten. They are much together at school and out of school, if opportunity can be

found. Such friendships may last for several months, although more commonly they last only a few days or weeks. We have observed many of these among kindergarten children four or five years old. Usually two children are chums. Less frequently three may be chums for a while. In one case we observed three boys who became great chums in kindergarten at the age of five. Their friendship continued through the first and second grades, until one of the boys moved to another city. We also have seen a few cases of three girls being chums in kindergarten for a short time. We have seen the close friendship between two boys or two girls lasting for some time, in several cases through kindergarten and several years thereafter. We would expect such cases to be found, because some of the children, having the traits which make for friendship, are likely to develop in ways which will continue their being chums. On the whole, however, pre-school children do not maintain such chumships for a long period of time, as nursery-school and kindergarten teachers often have observed.

The Relationship of Language to Social Development. The child's social development is profoundly influenced by his language development. Through language he not only expresses his thoughts and feelings to others, but he understands something of their thoughts, feelings, and desires. Language thus enables the child to understand others and gives him a ready means of influencing their behavior. It helps him in the development of social concepts of more complex and abstract nature. Anyone can observe the great amount of talk or conversation in a group of pre-school children at play, even though much of it may relate to the speaker and his exploits. At the earliest pre-school age, language is not the child's usual means of initiating contacts with others, nor is it the most common means at the age of five or six. Some object or activity of common interest is much more likely to be used to bring about social contacts. Only in later years of childhood and more particularly in adolescence does language hold a relatively important place in making social contacts. It is, however, a very important means of maintaining them, even during the

pre-school years. On countless occasions parents and teachers have observed children trying to hold attention by asking questions, by telling about events, or by other conversational efforts.

Social Attitudes of Pre-School Children. Bühler's classification of infants as socially blind, socially dependent, or socially independent may be applied also to pre-school children. Socially indifferent children are rare, however, at the age of four or five years. A few may be observed who seem almost lacking in social perception, and whose behavior is very little influenced by the activities of others. Mental ability has some effect on this characteristic. We have seen feebleminded children ten to twelve years of age who seemed to give no sign of being aware of the presence or activity of other persons. At the very bottom of the scale of intelligence there are always children whose social behavior is practically zero.

Social dependence or social independence may be quite marked in pre-school children, although most youngsters possess this trait in some degree intermediate between the extremes. The social dependence or independence of a child is probably the result of his training and experience more than of any other factors. We have observed many children in kindergartens of city public schools and in free kindergartens maintained by charitable and philanthropic organizations and have seen timid children lose much of their timidity in groups and develop leadership in group activities. The child on whom satisfactions are bestowed because of his submissiveness, who is threatened into frequent yielding, or who is given no opportunities for spontaneous and voluntary action, is likely to be dependent. When these circumstances operate in the opposite manner, independence results. Since most children receive these stimulations in an intermediate degree, they are neither strikingly dependent nor independent, or else they show these characteristics differently in various particular situations.

3. SOCIAL DEVELOPMENT AFTER THE PRE-SCHOOL YEARS

Social Concepts of Children Six to Twelve Years of Age. The development of children from the sixth to the twelfth years in intelligence and in language ability is marked by an extension of their social concepts. Many abstract terms which were only vaguely understood or not understood at all at the beginning of this period are more adequately comprehended at the age of twelve years. Some of them, however, are really understood only in the later teens or thereafter. Thus in one study,¹⁰ thirty-one abstract concepts were presented by means of interviews to each of 333 elementary- and secondary-school pupils to ascertain what meanings they associated with them. Such items as Americanism, socialism, radicalism, patriotism, militarism, pacifism, monopoly, standard of living, democracy, personal rights, conservative, and the like were used. Answers were scored 8 if they showed a high degree of comprehension, 0 if they showed no understanding (don't know's) or actual misunderstanding, and intermediate values for varying intermediate degrees of comprehension. The maximum score possible was 248. Two fourth-grade pupils scored 27.4; fifty children in the sixth grade scored 45.6. The scores rise somewhat more rapidly in the seventh grade, reach 95.0 in the tenth grade, and 158.9 in the twelfth.

The child's ability to identify facial expressions representing certain emotional states improves with age, as has been noted already. The development of social language is indicated by several tests in the New Stanford-Binet scale. Actual objects may be identified as to use by the age of from two and a half to three and a half years. Simple words such as *ball*, *hat*, and *stove* can be defined by the age of five. The understanding of abstract words is a later development. Only at age twelve can the average child define two of four words such as *constant*, *courage*, *charity*, and *defend*.

Such concepts as playing fairly, being kind, helping others,

¹⁰ Meltzer, *Children's Social Concepts: A Study of Their Nature and Development*.

and the like have their beginnings in the early pre-school years. Normally they are well developed before the advent of puberty. We must not conclude, however, that having an accurate knowledge of certain social concepts insures their operation in the daily lives of children. Often a notable discrepancy is found between knowledge and overt behavior.

Social Contacts and Adjustment of Later Childhood. Entrance upon school provides stimuli to many social reactions. The first reactions of children to school are not necessarily complete indications of their social development. Thus, a one-year study¹¹ of forty seven-year-old boys just entering school in Germany showed that thirteen were confident, sixteen indifferent, and eleven were shy. The early over-submissiveness to the teacher's authority tended to disappear during the first six weeks. Considerable disobedience was found, even though the authority of the teacher was clearly recognized and not disputed. Often difficulties arose because the boys did not know exactly what was expected of them, or because they misunderstood the meaning of a given command.

Various schemes for classifying children's social contacts have been devised. One type of classification used by certain German writers¹² divides social contacts into five principal classes. (1) Protective contacts are those in which the shy and submissive or uncertain child attaches himself to the self-assertive. If anything happens to break up the association, the timid child seeks someone else to whom he may attach himself. (2) Social contacts may reveal a certain kind of devotion in which a beloved or popular child is the center of a group, not because of any marked leadership, but because of his gentle, friendly, attractive ways which make so many children like him. (3) Social contacts also may be those of the "leader." (4) Sometimes they show the "despot." (5) A fifth type is that of the child who is socially unsuccessful. Leadership is discussed in section 4 of this chapter. Social contacts, charac-

¹¹ Rombach, in *Zeitschrift für angewandte Psychologie*, vol. 30, pp. 369-429.

¹² Rombach, *op. cit.*, and the work of K. Reininger reported by Charlotte Buhler, in *Kindheit und Jugend*.

terized as a despotism, tend to diminish by the time children finish kindergarten or enter first grade. Force as a controlling element becomes socially unacceptable and many children give it up. The socially unsuccessful child often is the one who has some physical defect or who has been badly neglected, having torn, dirty, or ill-fitting clothing. Often such children become trouble-makers in school. By the beginning of the school years the range of the child's social reactions is vast indeed. By the age of twelve years, nearly every type of social response has appeared, although the range and complexity of the situations evoking them are far from the scope shown in later adolescence or adulthood.

School Companions and Friendships. The child's social development during the second half dozen years of his life is marked by important differences in the stability, intimacy, and strength of his friendships, as well as in the character of his play and other interests. Companionship is not so largely determined by propinquity as in the earlier years when the child's range of getting about was narrowly limited to his immediate small neighborhood. Children of similar chronological and mental ages, of similar developmental ages,¹³ having a community of interests and common activities, tend to be companions. With the increased experience, mental ability, and general maturity resulting from age, lines of interest tend to become better defined. All of these conditions mean that his personality is developing and that his patterns of behavior are becoming more definite. Accordingly, the selection of companions becomes less childish and more mature as first puberty, then adolescence, maturity, and middle age approach. In later childhood, however, proximity may still be a factor, because it does provide opportunities for acquaintanceship and more or less intimate understanding. Thus, studies of gangs¹⁴ show that living in the same neighborhood (common environment) and being in the same grade at school are basic conditions underlying the forming of gangs. Other studies¹⁵ seem to show

¹³ Furfey, *The Gang Age*.

¹⁴ Furfey, *op. cit.*, Thrasher, *The Gang*.

¹⁵ See, for example, Detroit Teachers' College, *How Children Choose Friends*; Wellman, in *Journal of Educational Research*, vol. 14, pp. 126-132.

that children prefer as friends those who are quiet, self-controlled, "smart," good in their lessons, strong, and "not silly." At least, these are some of the qualities which they say they prefer.

Factors in the Formation of Groups. During the first four or five years of the child's life the factors that induce the child's contacts with others and the formation of groups seem to be helplessness and need, companionship in play, and common interests in toys or other objects. These earliest groups usually have two members, while later on larger groups are formed. During the years from six to twelve, common interests and activities, similarity in chronological, mental, and developmental ages, are factors underlying the formation of groups. Such groups are more stable and lasting than the rapidly shifting groupings of the pre-school years. Various environmental factors also may be influential, such as living in a certain neighborhood close to some other groups whose activities are well known. At about the eighth to tenth years boys and girls frequently form clubs or gangs of one sort or another.¹⁶ Many of these are short-lived. A name, membership dues, a time and place of meeting, a list of members, and no very definite specified purposes, are common characteristics of many clubs at this age. We have studied many of them among public-school children, ages eight to fourteen. Girls' clubs are common at these ages and are very transitory and short-lived. Boys' clubs seem to be more definite in their objectives and more lasting. It may be that boys feel a keener need for such social groupings. The intimacy, loyalty, and solidarity in some of these groups are truly remarkable, as various detailed accounts of them have shown. Community feeling, however, seems to be slow in developing. Tattling is found in the earlier school years. Identification of one's self with the group in such a vital way as to regard group success as highly satisfying is also slow in developing. Doing things for the good of the group, as in team-

¹⁶ Probably the best account of gangs is that given by Thrasher in *The Gang*, a study of more than a thousand gangs in the city of Chicago. Furfey, *The Gang Age*, also contains a valuable discussion of the recreational needs of the pre-adolescent boy.

work, develops gradually. Even several years after the child begins school it may have little motivating power in child behavior. As noted in Chapter XII, anyone organizing a baseball team of ten-year-old boys is not likely to have any scarcity of candidates for catching, pitching, first base, and short stop, but he will lack fielders.

4. LEADERSHIP DURING FIRST TWELVE YEARS

The First Manifestations of Leadership. Convincing evidence of leadership sometimes appears during the first year of life. Some infants from the age of six months show assurance in social situations. When placed with other infants of their age they show superiority or dominance. Children also differ in the amount of initiative shown in their activities. By the end of the second year two kinds of leadership can be distinguished in many instances. There is leadership (1) in which the child dominates by intimidating or attacking his associates, and (2) that in which his domination is secured by inspiring or encouraging them. In these early leaders are found two characteristics or qualities — the leader preserves his balance in the presence of the other children and leads in initiating and demonstrating any gestures or activities involved in their play. Leaders at these ages are likely to initiate more contacts than other children.²⁷

Leaders among pre-school children are likely to be leaders of small groups, usually of two or three children, more rarely of four or more. In fact, one differentiating characteristic of leadership during pre-school and school years is the smaller size of the groups in which the pre-school child manifests this trait. Sometimes a child in kindergarten shows remarkable leadership. He is the center of various groupings of children for various activities. The little fellow of two to five years may initiate a new game, such as a tea-party, playing house, and the like. He may be the domineering type who likes to boss other

²⁷ See Barker, *A Technique for Studying the Social-Material Activities of Young Children*; Bridges, *The Social and Emotional Development of the Pre-School Child*, chap. 5.

children, especially the younger ones, telling them what to do and what not to do. Such leadership has little value and the child often learns from his companions to give it up. If leadership is to be a social asset, it must be exercised for the benefit of all and not for the selfish desires of the individual exercising it. This principle is true during the pre-school period and throughout life as well.

Changes in Qualities of Leadership with Age. As children grow older certain important changes appear in the qualities of their leaders. By the age of ten or eleven years boys are much interested in sports of one kind or another. Accordingly, the leader must be good in sports and must have considerable initiative and vigor. He must possess strategy in handling social relations. He must be able to organize group activities. He must conform to the more pertinent desires of the group. Detroit school children¹⁸ affirm that their leaders shall possess ability and have creditable achievement. They place more emphasis upon these two qualities than upon social qualities. We must not be too sure, however, that their expressed views are really true. A better technique is to study the qualities of children who really are leaders to see what traits they do possess. This was the objective of an early study by Terman¹⁹ and more recent ones by Rombach,²⁰ Hollingworth,²¹ and Chevaleva and Sylla.²² These researches indicate that leaders usually have good physical strength, energy, and endurance and are characterized by vivacity, imagination, and intelligence. Their school work is not necessarily good. They have certain traits common to those whom they lead, such as common interests and similar social background. They are slightly superior in traits significant for the activity in which they lead. They possess traits which make them stand out from those who are not leaders. Being too superior to the others of a group,

¹⁸ Detroit Teachers' College, *How Children Choose Friends*.

¹⁹ *Pedagogical Seminary*, vol. 11, pp. 413-451.

²⁰ *Zeitschrift für angewandte Psychologie*, vol. 30, pp. 369-429.

²¹ *Gifted Children: Their Nature and Nurture*.

²² In *Journal de Psychologie*, vol. 26, pp. 604-612.

however, may be inimical to a child's leading it, as shown by an illustrative case of Hollingworth's. A boy of nine, whose I.Q. was 190, had practically no social contacts with his classmates in a fifth-grade class in public school, where the average I.Q. was 100. His less intelligent classmates did not choose him for any office or position of leadership. His interests and ability were so different from theirs that they did not understand or care much for him. He was placed in a special "opportunity" class where the average I.Q. was more than 160. Within the year he was elected editor of the class paper because he "knows so much," and class monitor because he "will make us behave." The following year he was elected captain to lead his class in contests with other classes.

It seems that certain abilities mark the leader at any age, whether in nursery school, elementary school, high school, college, industry, or other activities of adult life. These are initiative, organizing ability, interests common to the group, and enough superiority along certain lines to make him stand out from the rank and file of the group.

5. CHILDREN'S CONFLICTS

Conflicts Between Individual Children. The social relations of children are not always harmonious as our discussion up to this point might lead one to believe. Anyone who has observed children, even superficially, is fully aware of the great amount of conflict between individuals. Disagreements and unpleasant relations are found in infancy. An activity which one enjoys may be distasteful or painful to the other. A toy may be desired by both. One may seek to secure the property of another, or both may try to secure possession of something. A child may find pleasure in doing something that hurts another, and may enjoy doing the thing for its own sake, not because it hurts the other infant. Thus, the mother of healthy, well-developed twin boys aged nine months was awakened one morning by loud crying. One twin had the other's great toe in his mouth and was contentedly chewing it as he held on to the foot

with both hands, much to the discomfiture of the other twin who was wriggling and thrashing about as best he could and making a lusty outcry.

After infancy we often find disputes arising over toys, or when one child gets in another's way, or attempts to control or manage his activities. Some children are more aggressive than others. Often we may see a little fellow of two or three hit, pinch, or push another, apparently without any reason. Sometimes jealousy is a cause of young children's quarreling, as when a child of three or four resents another's advances to a child whom he likes. On the whole, then, pre-school children seem to have disagreements, disputes, or quarrels over many matters. We see little reason, however, for believing that any large proportion of very young children's disputes is caused by their love of fighting. In fact, we doubt if a large percentage of children really do desire conflicts or seek them. The impulses seem to be set off by events outside the organism rather than from within. Sometimes, however, a child may be observed whose domineering manner seems to be all set for a fight. We have seen such children who provoked a dispute and entered with keen enjoyment into poking, biting, hitting, shoving, and pinching their opponents and pulling their hair. Such cases are undoubtedly a result of training and previous experiences. They are found more rarely among girls than among boys.

Early conflicts are of short duration, many times lasting only a minute or two. Sometimes they last a few minutes, but long continued ones are relatively rare. Pre-school children seldom hold resentment for any long time following a conflict. Bridges²³ reports that children in a nursery school between two and five years of age are socially indifferent at first; then they show self-assertiveness and interfere with the liberties of others; and finally many of them come to show considerable consideration, sympathy, and kindness to the other children. One very striking value of the nursery school lies in the opportunity it gives young children to learn wholesome, effective group living.

²³ *Social and Emotional Development of the Pre-School Child*, pp. 82-85.

Conflicts continue to occur between children as they grow older and are much in evidence during their years in the primary grades of the elementary school. They are caused by much the same sort of factors as induce them at the earlier ages — activities in games, jealousies, overbearing, self-assertive and bullying behavior which disregards the rights of others, as well as misunderstandings and affronts of various sorts. We have observed a few in which the precipitating cause was some disparaging remark or other slighting behavior directed toward a chum of the child. Thus, two boys of seven years in the second grade were fighting after school one day. The fight lasted for some time and apparently the matter was settled. The next day the teacher questioned the contestants. John was a quiet, well-poised, vigorous lad who seldom had serious difficulties with other children. He had a very good friend, an inseparable chum named Philip, an only child, who was not aggressive, and whose mild, refined speech, mincing walk, and other manners gave one the first impression that he was a "sissy." John said frankly that he began the fight. The other boy had called Philip a sissy. "Philip is my friend. He walks like a sissy, and talks like a sissy, but he ain't no sissy." So John, for love of a friend, made the other boy retract his statement.

Conflicts occur less frequently as children approach puberty, but not because of any magic in the approach of sexual maturation. Children are learning to get along together with less friction and are finding such living socially approved and satisfying. Where home or other conditions place value and social approval upon the child's having conflicts, we are likely to find him developing accordingly. When conflicts among older children occur, they last longer than among pre-school children. Some children may develop a hatred of others that provides a fruitful source of other conflicts.

The behavior of the child in conflict with another varies according to his age and developmental status. Hitting, pushing, tugging to secure possession of a coveted toy or other object, biting, scratching, angry crying, verbal retort, verbal appeal to

adults, throwing sand, rocks, or other objects, and the like are common responses of younger children. These are found also among children from six to twelve. Fighting and verbal retort are common among older children. They also use most of the more specific activities listed at the earlier years.

Conflicts Between Groups of Children. Bona fide group conflicts do not arise until group loyalty and other cohesive forces lead the child to identify himself and his welfare with the group. Sometimes difficulties develop between small pre-school groups as when the dispute between two children is taken up by other members of each group. This is often the case in the small groupings of children found at the ages of six and seven years. We have observed many group conflicts involving children of kindergarten and primary grades which really began as quarrels between individuals. When group loyalties have become strong, trouble arises from time to time, as when boys' clubs and gangs interfere with each other's activities or when disputes arise in team games. When members of a boys' gang in one town or neighborhood go into an adjoining town or neighborhood, trouble sometimes occurs. Thus two small towns, less than a mile apart, considered themselves rivals, although what they were rivals over no one seems to know. Children have reflected the group animosities of their elders. A few years ago, if a group of boys of either town walked over into the other on Saturday night or Sunday afternoon the boys in the latter would try to pick a fight and usually were successful. Adult animosities for years prevented any sort of cooperation between the villages, even in religious, political, or other matters. County school authorities finally forced them to build a union school when their old buildings became inadequate and unsafe. The older people for years bitterly resented this outside authority which forced them to do what they did not want to do. Group disagreements between the children of the places, however, have ceased. Dissensions, of course, do occur among the children, but the alignments are not upon the basis of residence in either place. Such cases as these lead us to believe that children by nature are not necessarily warlike,

glorying in group or individual quarrels. They need help and opportunity to learn to live together happily and with a minimum of disagreement. Undoubtedly, training and the bestowal of rewards such as social approval may lead children to habits of seeking and enjoying conflict.

The Treatment of Conflicts. Children may well be allowed to settle many of their own disputes, for by so doing they learn much of the give and take of life. Wise guidance probably will insure that desirable outcomes are obtained. Public opinion may be developed so that, even with young children, it becomes a strong controlling force. We do not see how children can learn to live effective, self-directed lives if all the details of their existence are controlled with meticulous care by adults. In this concept lies the value of allowing children to fight out their own difficulties and disagreements. (See Chapter XIX.)

6. SOCIAL DEVELOPMENT SHOWN BY CHILDREN'S PLAY

Another indication of the social development of the child is the significant change which takes place in the kinds of play activities that appeal to him as he passes from infancy through the childhood years and into adolescence.

Individual Play. The earliest play observed among children is individual play, as when the child rattles some toys or beats them together. Some of his very early play activities are with adults, as in playing peek-a-boo, and the like. By the age of two years or a little later,²⁴ we may observe many a child playing with another child. At this early age he often plays merely beside the other child or near him, rather than *with* him. Often two children are together, but engaged in individual play. Some children retain the preference for individual play longer than do others. In many cases, this is caused by lack of social stimulation, or by a feeling of inferiority. Some handicaps, such as those of habits, physique, dress, intelligence, and the like, may overwhelm the child with such a feeling of in-

²⁴ See Bridges, *op cit.*, chap. 5.

feriority that he may prefer playing alone. Normally, he gives less time to playing alone as he gets older and has more experiences and more contacts with other children.

Group Play. Children of three and four years often are found playing some little game together. In fact, it is quite common for a child at these ages to plan some play activity and to get another child to engage in it with him. A later stage in his social development is seen when he devises or selects some game and gets a number of others to play it with him. Interesting and suggestive differences have been observed in the kinds of games preferred by children of different ages. Apparently, games in which children copy others, but not according to a definite sequence, are the most popular with pre-school children. Those which involve copying others and following definite orders are quite popular with children from four to six years of age. As children approach and enter the teens there seems to be a definite shift in popularity from games involving following definite orders to those in which they have more freedom in organization and in determining details. These changes in the kinds of games preferred indicate an important differentiation between younger and older children in the nature of the cohesive force needed to keep them cooperating as groups. (See also Chapter XII.)

7. FACTORS AFFECTING THE CHILD'S SOCIAL DEVELOPMENT

What is the influence upon the child's social development of such factors as health, physique, the family, play and other recreational activities, school activities, clubs, gangs, boys' and girls' camps, and the social order? Any effects of these factors which are especially significant for the child's moral development are discussed in the following chapter.

The most important factors affecting the child's social development are environmental. Of course, the most fundamental fact in social development is that the child, through his experiences, learns to get along with other people. The factors

which influence social development are therefore those which guide his learning processes or which determine the nature of his experiences.

Health and Physique. Good health is favorable to social development. The child who is well and feels well has an advantage over the one who is sick, undernourished, and lacking in vitality. Sickness during infancy as well as during the years of childhood tends to interfere with the development of suitable social behavior patterns. The child who receives an excess of attention, care, and solicitude during periods of sickness may become selfish, self-assertive, and domineering. The one who is undernourished and not strong may depend unduly upon others and become shy and submissive. He may develop a timid, fearful attitude in his relations to others. If a child departs greatly from the normal in physique, being much undersized or oversized, or if he has some noticeable physical defect, he is likely to be persecuted or tormented by other children. This may result in an exceptionally strong feeling of inferiority which interferes with his social development. Many cases are observed in which the sensitive child seems to shun normal social contacts with his fellows because of poor health, lack of vitality, or a consciousness of inferior physical status. Sometimes overaggressive compensatory activities add to the difficulty. We have observed many troublesome children whose poor social adjustments seemed to be the result of their poor physical condition. We have also observed a few cases in which physical defects seemed to interfere with the child's having suitable social relations with his fellows. Many of these cases, however, are complicated and made much worse by other conditions surrounding him, such as ineffective home training, bad companions, and other similar conditions.

The Family, the Institution. What effect does the child's position in the family have upon his social development? Some investigators²⁵ hold that the conditions surrounding the oldest child in a family are most favorable to his social development so long as he is the only child, but that after a brother or sister is

²⁵ See, for example, Adler, Alfred, *The Practice and Theory of Individual Psychology*.

born his position is more difficult. The youngest one is supposed always to be the spoiled child, whereas the conditions surrounding the middle child (or children) are described as least favorable to social development. The accumulating mass of evidence, however, seems to show that this problem is very complex and not to be settled by an invariable formula. The oldest, youngest, and middle children undoubtedly have problems of social adjustment caused by their position in the family circle. Each one meets stimuli varying according to his age, sex, order of birth, and the changed attitudes of parents caused by changes in their financial status, as well as by changes in their age, physical condition, and interests. Changes in the conditions surrounding parents may alter their ways of disciplining and training their offspring. Buhler²⁶ cites the results of many studies of German and Austrian children which indicate the following conclusions: In the poorest social surroundings, the only child did better school work than did children who had brothers or sisters, but children from homes of average social-economic status did better school work if they had one or two brothers or sisters. Some studies seem to show that only children do better school work, but that they may be more prone to nervousness, timidity, talkativeness, and dictatorial and anti-social behavior, and that they are not so popular with other children. Those with brothers and sisters are sometimes believed to be happier and gayer than only children. We cannot take all of these results at face value, however, because studies of American children by the author and by others²⁷ show that the only child probably is superior to those having brothers or sisters and is not more inclined to sadness, nervousness, and the like. On the whole, we are inclined to believe that the child's position among brothers and sisters is of far less significance for his social development than many other family

²⁶ *Op. cit.*, pp. 402-403.

²⁷ See Fenton, in *Journal of Genetic Psychology*, vol. 35, pp. 546-556; Guilford and Worcester, in *Journal of Genetic Psychology*, vol. 38, pp. 411-426; Hooker, in *Journal of Genetic Psychology*, vol. 39, pp. 122-125. The author collected data on the traits and achievement of more than thirty only children and nearly three hundred non-only children. The results are in essential agreement with the foregoing reports.

conditions, such, for example, as having but one parent or being a foster child, a step-child, or an illegitimate child. The character of the parents and the kind of training they provide are powerful forces shaping the child's social development, especially those features which usually are characterized as morality.

Play and Other Recreational Activities. Play and other recreational group activities are very important factors in the child's social development. In them he has so many first-hand vital contacts with other children that he learns much of living with others. The companionships in play activities are important factors in the child's life, a fact well established by numerous studies of delinquents and non-delinquents. The community and the child's parents have the responsibility of insuring to each child adequate play facilities under such wholesome conditions as will further his suitable development. The child's play has an important place in his moral growth, as we see in Chapter XIV.

School Activities. A number of studies have been made of the effect of schooling on the social development of the child. Children in nursery schools develop more rapidly than those not in nursery school in such social traits as cheerfulness when toys are taken away or withheld, talkativeness, starting activities on their own initiative, and showing sympathy for a stranger who feigned weeping.²⁸ The environment of a good nursery school provides such a wide variety of powerful stimuli to social and intellectual development that advantageous results are to be expected. On the other hand, a highly formalized, narrow routine in an institution should not be expected to produce very satisfactory social or intellectual development. The types of situations in which children live have more significance, it would seem, than the mere fact of living in an institution, attending some kind of nursery school, or living at home.

Not only do the activities of the child in a nursery school

²⁸ See Walsh, in *Child Development*, vol. 2, pp. 72-73. On intellectual development while attending nursery school, see Wellman, in *Journal of Experimental Education*, vol. 1, pp. 48-69.

have distinct value for his social development, but also the good modern elementary school makes its contribution. The narrow limited conception of education which dominated the school in the "good old days" (which weren't) often led to a meager, more or less arbitrary and abstract intellectual program. Many of the social virtues were badly neglected, except as they may have been fostered in play and games and in some of the occasional entertainments or school programs. A good modern school helps children learn to live together happily and effectively while engaged upon socially and individually useful activities. By its alertness to adaptive difficulties it helps the child learn at an early age some of the give and take of getting along with others. The timid child has many opportunities to do for or in a group the things which he can do best. With practice he begins to lose his timidity. If he reads well, he may read some little story to his own class or to some other. He distributes supplies, carries a note to the principal or to another teacher, or reports on something he has read or observed. A wide variety of specific things are utilized by the good teacher to help the pupil overcome some undesirable trait or to develop a desirable one. In the kindergarten, nursery school, and primary grades of the elementary school may be found innumerable opportunities for furthering the child's social development. The school's influence upon the social and emotional development of many children probably is of greater value than its contribution to their fund of academic information.

Clubs, Camps, and Gangs. The clubs, gangs, or other spontaneous groupings of children exert a strong influence upon their social development. Children who are members of clubs are likely to be more cooperative than those who are not.²⁹ Other valuable social traits also may be fostered by suitable groupings. The Boy Scouts, Girl Scouts, and Camp-Fire Girls have exerted a powerful influence upon the social traits of children and youth. Two important conditions of success of such organizations are (1) enough guidance to insure wholesome activities and (2) enough freedom to satisfy the child's craving for direct-

²⁹ See Hartshorne, May, and Maller, *Studies in Service and Self-Control*.

ing his own affairs. Their broad programs are highly desirable and may well supplement much of the usual undirected activity of children in spontaneous groupings.

Summer camps are also a valuable asset in the social training of boys and girls. They give them many varied wholesome contacts with others of their own age, as well as with men and women who are striving to aid in their social development. The change of environment from home to camp is very stimulating for most children. This is true especially of children living in the city because of the artificial conditions under which so many of them live. Getting away from home and parents, living a wholesome outdoor life, and participating in the varied group activities of a good summer camp are valuable experiences for the child. The close intimate contacts with other children under the conditions of life in a good summer camp have distinct value in the child's learning to adjust himself to others. Investigation³⁰ has shown that boys' parents regard the following as important values of camp life: It increases the boy's confidence in himself, makes him more courteous, more considerate of the welfare of others. He meets and mixes with others more easily, cooperates more readily, takes better care of property, is more unselfish, shows more initiative and resourcefulness, assumes leadership, and is sensitive to the feelings of others to a greater degree. The boys themselves, however, place chief emphasis upon the following as the chief values of camp life: They are most interested in developing skill in swimming, canoeing, and campcraft, in learning to get along with others, in better health, unselfishness, willingness to help others, self-confidence, initiative, self-reliance, development of courage, meeting and making friends.

Gangs exert a powerful influence on boys and girls. Boys' gangs are more numerous, probably because of the freer life they are allowed to live.³¹ Their strongest appeal is likely to be

³⁰ See Dimock and Hendry, *Camping and Character*, Mason, *Camping and Education*.

³¹ For a fuller account of gangs consult such standard works on the subject as Furfey's *The Gang Age* and Thrasher's *The Gang*. Earlier discussions of the psychology of the gang are given by Hartson, in *Pedagogical Seminary*, vol. 18, pp. 353-414, Puffer, *The Boy and His Gang*; Sheldon, in *American Journal of Psychology*, vol. 9, pp. 425-448.

found between the ages of ten and fourteen. The strong sense of solidarity and security in the gang is a powerful cohesive force. Where conditions of life make adjustment difficulties increasingly hard for children to meet, we may expect to find them banding together in gangs. Children in congested city areas have difficulties in adjusting themselves to their surroundings. In such places gangs are more likely to flourish than in the less thickly settled urban areas. Loyalty is a cardinal virtue in gang life. The serious danger, however, is that the activities may become highly anti-social. Attempts to get members of gangs to join adult-directed organizations have not been very successful, because the boy in the gang has felt an independence, solidarity, and security which he does not want to give up. Wise direction of the gang's activities is the goal to be reached, whether this be done through an existing group or through membership in Boy Scouts, Y.M.C.A., or other adult-supervised groups.

The Social Order. For better or for worse the existing social order exerts a powerful influence upon the child's social development. The group customs, the "mores," tend to become guiding lines in his development. His knowledge of what is socially approved and what is socially tabooed governs much of his conduct. The influence of the social order in Russia ³² is clearly seen in the results of two studies of pre-school children. In the first one, children in two kindergartens in Kiev were studied (fourteen boys and twenty-one girls; thirteen boys and twenty-two girls). The first kindergarten was in the center of town. Most of the parents were skilled laborers or officials who observed no religious holidays but only revolutionary holidays. Very little family life existed. Free marriage was very common. The second kindergarten was on the edge of town. The parents were mostly poor unskilled laborers, beggars, or street traders, but they observed the old religious customs. Children from the first kindergarten formed larger groups than children from the second. The games played also differed,

³² See Doroschenko, in *Zeitschrift für angewandte Psychologie*, vol. 30, pp. 150-167; Salusky, in *Journal of Social Psychology*, vol. 1, pp. 367-378.

TABLE 18. INFLUENCE OF HOME ENVIRONMENT UPON KIND OF GAMES ENGAGED IN BY KINDERGARTEN CHILDREN IN RUSSIA
(From Salusky's Data) *

GAMES REPRESENTATIVE OF	PERCENTAGE OF CHILDREN ENGAGING IN VARIOUS GAMES	
	Kindergarten No. 1	Kindergarten No. 2
Old mode of life	6 3	49
Labor	14 6	36
Small tradesmen	0 0	9
Ways of communication	10 4	0
Communal household	24 2	0
Revolutionary modes of life	6 2	0
Dramatization of fairy-tales	8 3	6
Revolution depicted in the games	16 6	0

* Salusky, A. S., "Collective Behavior of Children at a Pre-School Level"; *Journal of Social Psychology*, vol. 1 (1930), pp. 367-376

being much influenced by the style of living. In the other study two similarly differing groups of parents are represented. Here also marked differences in games were observed, the children engaging in those representative of their conditions of living, as shown in Table 18.

The environment's potency may be seen in the kinds of games played by children under various conditions of life, as in the city, on the farm, in a fishing village, or in a mining or lumber camp. Or we may see its potency in the games played after some trip or excursion has been made.

A profound effect upon the child's social attitudes results from the environmental circumstances surrounding him as he passes from infancy to childhood and on to adolescence and maturity.

SELECTED REFERENCES

For general treatment of social behavior see Dashiell, *Fundamentals of Objective Psychology*, chap. 14; Dockeray, *General Psychology* (revised), chaps. 30, 31; Myerson, *Social Psychology*, chaps. 10-12; Powers, in *Educational Psychology* (edited by Skinner), chap. 9; Trow, *Educational Psychology*, chap. 10; Warren and Carmichael, *Elements of Human Psychology*, chap. 16.

On the social development of children see Baldwin and Stecher, *The Psychology of the Preschool Child*, chap. 11; Bridges, *The Social and Emotional Development of the Pre-School Child*, chaps. 4-7 (contains a social development scale and a discussion of children's social relations with each other and with adults); Buhler, in *Handbook of Child Psychology* (revised edition, edited by Murchison), chap. 9 (contains bibliography of approximately 200 titles); Gesell, *The Mental Growth of the Pre-School Child*, chaps. 11 and 32; Jersild, *Child Psychology*, chap. 7; Murphy and Murphy, *Experimental Social Psychology*, chaps. 6 and 7; Shirley, *The First Two Years*, vol. 2, *Intellectual Development*, chap. 5; Stoddard and Wellman, *Child Psychology*, chaps. 11 and 12; Wagoner, *Development of Learning in Young Children*, chap. 8.

For a discussion of gangs see Furfey, *The Gang Age*, or Thrasher, *The Gang*. Additional references are given at the end of this volume.

CHAPTER XIV

CHILDREN'S CHARACTER AND CHILDREN'S RELIGION

THE development of the character of the child is a vital concern to society. The nature and growth of a child's moral character present many intricate psychological problems. What is the meaning of moral character? What are its constituent elements, and how do habits, purposes, and ideals enter into it? What are the typical stages in the development of children's morals? Of what extent and significance are individual differences in children's morals? What are the influences of heredity, home, church, companions, group membership, various types of recreational activities, and the social order, on the development of character? These are some of the questions to which answers must be attempted.

The religious life of the child is also the source of many interesting issues. What are the origin and development of the child's religious beliefs? What is the relationship between his religion and his moral conduct? How may parents, teachers, and religious leaders assist the child in his religious development?

Many important problems such as these face the person who is responsible for the wise training, guidance, and control of children. Some of these problems can be solved with the assistance of scientific evidence now available, but the solution of others requires far more valid information than we now possess.

I. THE MEANING AND NATURE OF MORAL CHARACTER

Morality as Conformity or Intent. The word morality comes from the Latin *moralis* which in turn is derived from *mores* meaning manners, customs, folkways, or conduct. Was it

not Cicero who urged at one time that *moralis* should be used to mean "right" or "righteousness"? Two contrasting points of view concerning morality are of interest. The one looks upon morality as behavior which conforms to the manners, customs, or standards of the group to which the individual belongs. When this view is greatly emphasized, mere conformity to customs and folkways is the criterion of one's morals. According to the other view, morality refers to the motive or intention of the person whose action is being evaluated morally. Both of these views are useful, and they need not be considered contradictory. Morality does imply conformity to group standards of conduct, but mere conformity is not an adequate criterion; the individual's purpose or motive is an essential ingredient.

The Common Good as the Motive of Conduct. Morality involves right and wrong responses; but not right and wrong as matters of fact or truth, as when a child has the correct or incorrect answer to some problem. Moral responses are right responses when judged by some personal or social standard, that is, essentially righteous responses. The moral education of children requires not only that they respond to many situations and problems in accordance with present ascertained fact (the intellectual aspect of their behavior), but also that they conform to accepted or right standards of value and are activated by right motives (the moral quality of their behavior).

The definition of right responses is clarified by the concept of the common good as the motive of conduct. The individual of high moral character is the one whose conduct is intentionally for the common good. Moral codes based on common agreement have value in acquainting all persons with desirable standards of conduct and enabling them to evaluate their conduct from time to time. These are highly significant values. But conformity to conduct codes is not an adequate criterion of the development of moral character. It neglects a highly important condition in the individual who is being trained. It neglects his mind-set, attitude, or purpose; those elements

which incline him to act for the common good of his own accord, without external compulsion. The pragmatic test of character, of course, is conduct — what the individual does. The person who has good moral character will act according to essential features of conduct codes. His overt behavior will be for the common good. The best insurance of an individual's continuing to act for the good of his group is for him to feel satisfaction when he acts so, and annoyance when he acts otherwise. Satisfaction or dissatisfaction may flow from the external concomitants of an act, as when desirable behavior is rewarded by some form of social approval, or when an undesirable response leads to social disapproval or some other form of punishment. Satisfaction may flow also from the response's being in accord with the more permanent inclination, set, purpose, or ideals of the individual who is responding. In the latter case a more firmly fixed element of his disposition or character is functioning than if external reward or punishment alone were the motive activating his behavior.

External control and guidance seem to be both necessary and desirable in building up many habits and other elements comprising moral character. If they are used widely and effectively, the child will become habituated in making certain responses. He also will enjoy making them and eventually will come to make them without the external force. Constant external compulsion tends to prevent the child from developing self-control. We desire that individuals act for the common good, not because public opinion, law, or other similar force compels them to do so, but because of some inner sanction, because of their own disposition or character.

The Transition from External to Internal Authority. An important step in the moral growth of children is the transition from external to internal authority as the sanction for many conduct responses. This inner desire or inclination to act for the common good is a *sine qua non* of truly moral character. Courtesy, honesty, truthfulness, and the like are desirable habits, but an individual may exhibit these virtues because it is the "proper thing" to do. He may be highly self-centered,

but he may be honest just because, selfishly considered, honesty is the best policy. If self-interest is the real motive, then his conduct may be "shot through with a shrewd, cold, calculated, selfish weighing of alternatives which results in conduct for the common good when self-interest is also served or when such conduct cannot be avoided, but in anti-social behavior on all other possible occasions." The transition from outer to inner authority seems to be furthered (1) by the use of group approval and other similar incentives which lead the child to enjoy making suitable responses, and (2) by his participating in group activities in such fashion that he comes to identify many features of his own good with that of the group to which he belongs. Group loyalty and the welfare of the group then may motivate some of his behavior.

Laws, rules, regulations, and other forms of public opinion and social taboos serve two important purposes. First, they help acquaint the developing individual with group standards of what things ought to be done and what things ought not to be done. Second, they help secure action by him in accordance with them. By the time the child is mature, however, external authority should be unnecessary. His behavior should be for the general social welfare. That such rules, laws, and regulations are needed to prevent anti-social behavior by many adults is evidence that more effective moral training is necessary.

Character as a System of Inner Forces. We may consider moral character as a system of inner working forces, and may analyze it into its psychological characteristics, or describe it in psychological terms as a process or series of processes. We also may think of it as embracing certain patterns of response, such as habits, knowledge or information, and ideals or socialized motives.

According to Dewey¹ moral character on its dynamic side has three necessary constituents: (1) force or energy, (2) intellectual judgment, and (3) emotional responsiveness. Driving force or energy is that quality by virtue of which the individual

¹ *Moral Principles in Education*, pp. 49 ff.

overcomes obstacles and carries enterprises through to completion. It insures efficiency in action. It is an essential quality because the realization of socially desirable purposes often necessitates continued effort in the face of strong opposition. It is needed in overcoming the inertia of outworn customs and codes. Energy is needed to secure overt action. The energy or overt action, however, must be suitably directed. Life is increasingly complex, and its problems are intricate. The best responses may not be the simplest or the most obvious. Accordingly, good intellectual judgment is needed to analyze the complex problems and evaluate a wide variety of possible responses so that behavior may be the most appropriate in a given situation. Emotional responsiveness is needed to incline the individual to do the thing he knows is best and to give him a strong impulse to do it.

The value of these elements can be more readily seen if we consider what a person's character would be like if he lacked in turn each of these qualities. If he lacked force of energy but had good intellectual judgment and emotional responsiveness, he would be a wide-awake, alert individual who could analyze situations and see and feel what would be the best thing to do, but he would lack the force to do anything. Knowing and feeling, he would make no effective overt action. If he possessed the first and third traits but lacked good judgment, he would be the impulsive man who actually did get things done, but the things done would not necessarily be the best in that particular situation. Such persons are energetic and emotional but use poor judgment. If the person had energy and sound judgment but lacked emotional responsiveness, he would be cold, indifferent, and perhaps hard and inflexible in his dealings with others. This delicate personal responsiveness is of great importance in character. Of it Dewey² says, "Indeed, good judgment is impossible without this susceptibility. Unless there is a prompt and almost instinctive sensitiveness to conditions, to the ends and interests of others, the intellectual side of judgment will not have proper material to work upon. Just

² *Op. cit.*, p. 52.

as the material of knowledge is supplied through the senses, so the material of ethical knowledge is supplied by emotional responsiveness."

These inner dynamics of character throw much light on the problems of moral training. Good physical health with an abundance of energy, and also practice in doing things, are likely to be of help in developing the first quality. Training in an impartial search for the truth and practice in analyzing situations and problems to see what things are best for the group may be expected to facilitate the development of the second. Trying to see what is fair to others in actual moral situations confronting them and making concrete applications of high ideals to such situations may help children develop the third. In all cases the use of the principle of satisfaction and dissatisfaction in vital concrete situations in the child's everyday life is appropriate.

Habits, Knowledge, and Ideals as Elements of Character. Character often is analyzed into such constituent elements or patterns of response as habits, skills, knowledge, attitudes, purposes, ideals, and appreciations. Obviously, these terms overlap in meaning. When one makes an extended list of desirable traits or patterns of response, he is likely to refer to honesty, trustworthiness, truthfulness, courtesy, and the like. The more one extends such a list and the more carefully he examines it, the more is he likely to be impressed by the large place that learning has in the molding of character. Character education may be regarded as largely a matter of habit formation, although other concepts than that of habit are also useful. At any rate, the importance of habits in the child's moral development can hardly be over-emphasized. Apparently, the most effective way of forming habits is to form them in situations and ways very similar to those in which they are likely to be used, so that they may fit into the total integrated pattern of the individual's traits. The specific nature of learning should not be overlooked in forming habits of character. What we learn is the reaction we make. It is possible to train a child to be honest in specific situations, but he cannot

be trained to be honest "in general" at the outset. Only with much experience in being honest in particular situations can a generalized pattern of being honest be formed. Intellectual maturity is necessary for generalized habits. The average boy of twelve cannot be expected to have a generalized behavior pattern of honesty, even though he may be honest in many concrete situations that he has experienced.

Knowledge is important in moral character. Life's complexities are so great and the child's knowledge so meager that the gap between them seems impossible to bridge. In fact, we believe that the acquisition of knowledge by the age of eighteen or even at graduation from college will not be adequate to enable the individual to meet effectively his obligations as a citizen. The child is a beginner, but the adult in middle life or beyond needs also to acquire new information on problems confronting him and his society. Knowledge, like habits, should be useful. It should be acquired in ways and situations in which it is likely to be used, rather than as "stored-up" verbal facts. Parents and teachers need an openminded dispassionate love for the truth so that very early they may try to train children to the same love of truth. The task is difficult because adults' and children's prejudices and emotions get in the way. Building up a desire for finding pertinent facts as well as training in effectively finding them is a task requiring many years and a degree of intellectual maturity that runs beyond the period of childhood and early adolescence.

Ideals or Socialized Motives. Nearly all students of human behavior regard ideals and purposes as essential elements in moral character. By ideals is meant a variety of things. One useful meaning is that an ideal is an idea plus an impulse to action. Ideals, according to this definition, are motives. High ideals of conduct leading to desirable behavior are socialized motives. We have already seen (Chapter XII) that physiological drives and social motives often are intimately blended in concrete human activities.

Socialized motives are best formed in situations in which the

impulse to action eventuates in satisfying conduct. By this means the organism is placed in a state of readiness so that upon appropriate stimulation the desired response follows. Both the intellectual element and the impulsive element of socialized motives must be considered. If the child identifies himself and his desires with the welfare of the group by active participation in group activities, and if he finds such conscious identification and activity satisfying, he has begun to form socialized motives. The ideals or motives of young children must be simple, concrete, and specific. The two-year-old, who is trained to feed himself and who resents help from adults, is forming the habit of self-reliance. If trained to dress himself and to do other things for himself, he also is reinforcing this desirable tendency further. If he is wisely guided and controlled, he will find much satisfaction in such behavior. If, however, the *idea* of doing things for himself and that of self-dependence also are emphasized, we often say he is forming an ideal of self-reliance. What is the essential difference then between ideals and habits which are effectively formed? Obviously, ideals are a kind of habit.³ Well-formed habits are learned tendencies to act in a certain way upon a given stimulation. The element of readiness, inclination, or motive is present. Add to it *the idea* which partakes somewhat of the nature of a generalization or highest common divisor running through several concrete experiences or responses, and it is essentially an ideal.

2. THE MEASUREMENT OF CHARACTER

A more precise knowledge of the nature and development of moral character in children has been gained in recent years through the invention of techniques for measuring a number of character traits. Three principal types of method have been used to measure certain aspects of children's morals. These are: (1) tests which measure actual behavior; (2) tests apprais-

³ Cf. Symonds, *The Nature of Conduct*, chap. 17, for a discussion of the view that conduct comprises habits and skills

ing knowledge and attitudes; and (3) rating (or ranking) scales for a wide variety of traits.⁴

Tests of Conduct. Testing the child's actual moral conduct in real situations would seem to be the most valuable approach to the study of character. Several difficulties, however, have retarded progress in this direction. The two chief handicaps lie in (1) the difficulty of securing enough real behavior situations which lend themselves to measurement, and (2) the fact that behavior tends to be specific rather than generalized.⁵ We can measure a child's honesty in a given situation, but we do not know how honest he will be in other situations. Fortunately, we are not so much interested in a person's general honesty as we are in his honesty under certain definite conditions. Voelker⁶ was a pioneer in devising tests to measure overt moral behavior. He sought to measure trustworthiness by using a battery of ten tests including such tests as the following — not returning over-change; not returning borrowed property; cheating in scoring one's own test paper (alterations being detected by use of a waxed copy); peeping while performing a task which was to be done with eyes closed; receiving aid in solving puzzles after being placed on his honor not to receive any help; etc. In the first test the child was sent to the store to buy an article. He was told it would cost a certain amount. The actual price was a few cents less. Did he return the over-change which he believed the examiner was not expecting?

A great deal of work has been done since Voelker's pioneer testing in 1921.⁷ One of Hartshorne and May's⁸ tests to meas-

⁴ For an introduction to the literature on this topic, see the following Brooks, *Psychology of Adolescence*, pp. 356-369; Hartshorne and May, *Studies in Deceit*, Book I, pp. 1-147; Hartshorne, May, and Maller, *Studies in Service and Self-Control*, Book I, pp. 13-118, 279-360; Hartshorne, May, and Shuttleworth, *Studies in the Organization of Character*, pp. 7-92, 213-288, 361-370; Jones, in *Handbook of Child Psychology* (rev. ed.), pp. 486-496; Shaffer, *The Psychology of Adjustment*, chap. 11; Symonds, *Diagnosing Personality and Conduct*, chaps. 2-14, and *Psychological Diagnosis in Social Adjustment*, chap. 5 and Appendix; Thurstone and Chave, *The Measurement of Attitudes*; Watson, in *Psychological Bulletin*, vol. 29, pp. 147-176.

⁵ See Chapter XVIII on the integration of traits. See also Hartshorne and May, *Studies in Deceit*, Book I, chap. 21, on the "Specific Nature of Conduct and Attitude."

⁶ *The Function of Ideals and Attitudes in Social Behavior.*

⁷ See references at end of this volume, especially the work of Cady Jones, Lincoln and Shields, and Raubenheimer.

⁸ *Studies in Service and Self-Control*, Book I, chap. 3.

ure cooperation and charity illustrates this type of measuring instrument. As a present from a friend of the school each child in a class was given a large envelope containing an attractively colored pencil case in which were a drinking cup, pencil sharpener, ruler, pen, eraser, penholder, double pencil, and three additional pencils. He was told that it was his very own to do with as he pleased. After the children had examined their kits for ten minutes, the teacher said she wanted to pass on to them a suggestion from the principal. She announced that many children in other schools did not have nice kits like these with such interesting things in them; that some of them might like to help make up kits for them; that, if they wished to, they might give one, two, three, or all ten of the articles and the box, too, or just the box. They were then told to put anything they wanted to into the envelope and put it in a large basket at any time before they left school that day. "It is quite all right for you to keep any or all of the kit if you would rather. The kit belongs to you." Each envelope had the pupil's name on it, so that the results could be checked. A scheme of scoring was arranged. Thus if a pupil put only the eraser in the envelope it scored five points. If he gave the box, he earned five points, etc., the total score possible being thirty-six points. The authors report that many penholders were given away — nearly all of the children had fountain pens. Second-hand articles often were given. If they were in good condition, half-credit scores were allowed.

Knowledge and Attitude Tests. Tests of moral knowledge and attitudes have been developed to cover a wide variety of situations, such as evaluating offenses, interpreting proverbs, answering questions on ethical principles, foreseeing probable consequences, testing social standards in various childhood situations, testing knowledge of duties, principles, and social ethical vocabulary, racial attitudes, and attitudes toward social conventions. A variety of interests and preferences have been inventoried, such as activity preferences, reading interests, and preferences for characters described in brief character sketches. Experimenters do not assume, of course, that social

or moral knowledge is a perfect indication of moral character. Such tests have been used chiefly for investigating the relationships between knowledge and actual overt conduct.

Rating Scales. Rating scales are available for a wide variety of qualities and traits of moral character. Their reliability is dependent in part upon the number, competence, and willingness of those who make the ratings. By carefully defining the item of behavior to be rated and dividing it into several smaller subtraits, the ratings become more reliable. A fundamental obstacle to valid rating is the fact that judgments at best are subjective. Broad estimates of moral or other personal qualities are difficult to analyze into definite behavior patterns. We do not, for example, perceive directly such a thing as honesty. It is inferred from what is known of the child who is rated. By using several raters a better estimate is secured because the composite judgment of several persons tends to give the rating which the child has among all who know him. By basing ratings upon personal knowledge of specific responses revealing a trait rather than upon a hazy, general impression we are likely to secure estimates which are more valid and reliable.⁹

3. STAGES IN MORAL DEVELOPMENT

Non-Moral, Transition, and Truly Moral Periods. Sometimes three stages in moral development are noted. When such divisions are used, the conduct of earliest childhood is regarded as unmoral or non-moral, for the child merely conforms to the demands of those directing and controlling his behavior. The child is not really moral or immoral. He is merely unmoral, according to this view. Before he reaches the stage of true morality he must acquire a broad knowledge of life, acquire standards of conduct, and learn to perceive his personal responsibility to himself and to his ideals for what he does. Early adolescence is supposed to be the time when the transition is made. Later adolescence and adult life are supposed to be the time of true morality.

⁹ See also section 2 of Chapter XV for other means of appraising personality traits.

Such a division into developmental stages has some value. One must be cautious, however, in applying it. It must not be concluded, for example, that personal sense of duty and responsibility, ideals, and altruistic behavior are unknown before the teens, suddenly appear at puberty, and are universally characteristic thereafter. From many converging lines of evidence it seems reasonably clear that gradual development is taking place. Even though this gradual change has been unobserved in the past, it nevertheless was present. Modern techniques permit the detection of the quantitative changes in moral conduct. Careful observation of the actual behavior of children shows that the transition from responses motivated by outer compulsion to those activated by inner necessity (from selfish to unselfish motives) may antedate puberty three or four years for certain particular situations. Hartshorne and May's¹⁰ studies also indicate that some children do act for the common good, cooperate, and are prompted by the charity motive as early as the age of nine, which was the youngest age tested. We are inclined to believe that moral growth usually is gradual rather than a matter of separate, sharply contrasted periods. Many habits function daily in the child's behavior, and they function without external compulsion. Growth seems to involve the extension of the number of such smoothly functioning patterns of response.

*Moral Growth and Levels of Conduct.*¹¹ Human conduct is said to function on four levels, which may be envisaged, at least from one point of view, as evidences of the child's moral development. The first level includes unlearned behavior (according to McDougall, instinctive), as modified by the natural consequences of the act, as when the child learns not to strike his hand against sharp or hot objects, or he makes (or learns by actual experience not to make) certain native responses to various situations. This is the earliest level of conduct. Behavior is organized upon it from early infancy and in many of its aspects remains at this level throughout life, because the

¹⁰ See, for example, *Studies in Service and Self-Control*, Book I, chaps. 3 and 6.

¹¹ See McDougall, *Social Psychology*, for a discussion of levels of conduct.

responses continue to be adequate. Accordingly, no essential changes are made in them, and they become fixed modes of response. The second level is that of reward and punishment as administered by parents, teachers, and others. It is an external control. Behavior is organized upon this level early in childhood and many responses of the first twelve years illustrate it. A third level is that of social approval and disapproval of the group to which the individual belongs. Group opinion or sanction is a powerful motivating force, as we have already seen, especially at the gang ages. It is operative before that time, as we have seen in Chapter XII in discussing the prestige motive. The fourth level is that of altruism. Upon it the individual's behavior is motivated by the desire to act for the common good. Being truly moral implies conduct upon the level of altruism.

Usually altruism is regarded as the highest moral virtue. Often it is considered an ideal which is impossible of attainment because human beings are said to be essentially selfish.

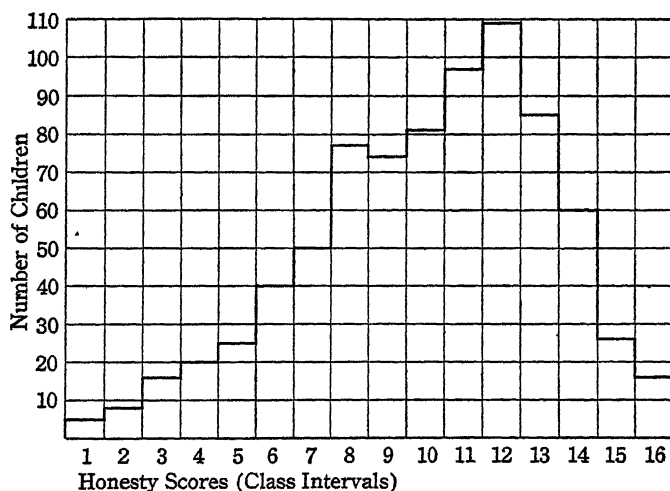


FIG. 130. DISTRIBUTION OF HONESTY SCORES OF 789 CHILDREN ON A TEST OF CHEATING

(Hartshorne and May, *Studies in the Organization of Character*, p. 488.)

That the infant is egocentric no one doubts. That his egocentrism continues throughout childhood also is undoubtedly true. What place then is to be found for altruism? As the child has a wider range of experiences, activities, and associates he comes to identify his good with an ever-widening group of other individuals. Altruism, according to this view, is merely egocentrism where the circle of one's self has been indefinitely expanded. His interests embrace all persons. Genetically much may be said for this view.

Individual Differences in Children's Morals. The moral behavior of children shows wide variation for any age, grade, sex, or intellectual level, as might be expected from the facts of individual differences in other traits. We give here two illustrative graphs to show the wide range of differences found in certain features of children's morals, as measured by Hart-

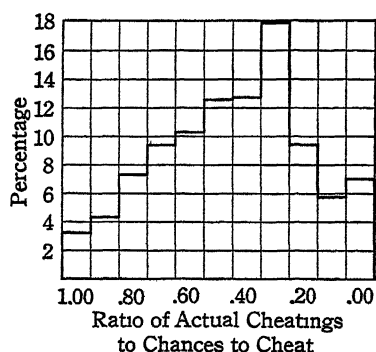


FIG. 131. INDIVIDUAL DIFFERENCES IN HONESTY SHOWN BY DISTRIBUTION OF CHEATING RATIOS OF 2443 CHILDREN IN GRADES FOUR TO EIGHT (Hartshorne and May, *Studies in Deceit*, Book II, p. 220)

shorne and May's tests. Figure 130 shows the distribution of honesty among a group of children as determined by one measure. They were given a rather difficult "general information" test, and then allowed to mark their own papers without supervision. Cheating consisted in changing wrong answers to right ones, which was detected by means unknown to the children. It is evident that honesty is distributed in a manner not unlike height or intelligence, with more children possessing an

intermediate degree of the trait than at either extreme. Figure 131 shows the result of a number of tests of cheating. Only 3.2 per cent of the children cheated at every opportunity; only 7 per cent never cheated. The largest (modal) number cheated approximately one-third of the time.

4. FACTORS INFLUENCING CHILDREN'S MORALS

The Influence of Age on Children's Moral Behavior. Since any kind of development requires time, the maturity and experience represented by age may be expected to have some influence on children's morals. Experimental evidence throws some light on the problem. For example, Tudor-Hart¹² asked more than fourteen hundred children in grades five to twelve two questions: (1) "Are there cases in which lies are necessary?" and (2) "A person cannot obtain a position as an engineer in New York state without passing a certain examination. A young man passed this examination by cheating. A position as engineer was offered him. He felt bad because he did not feel fit for the position. His mother is poor. Shall he

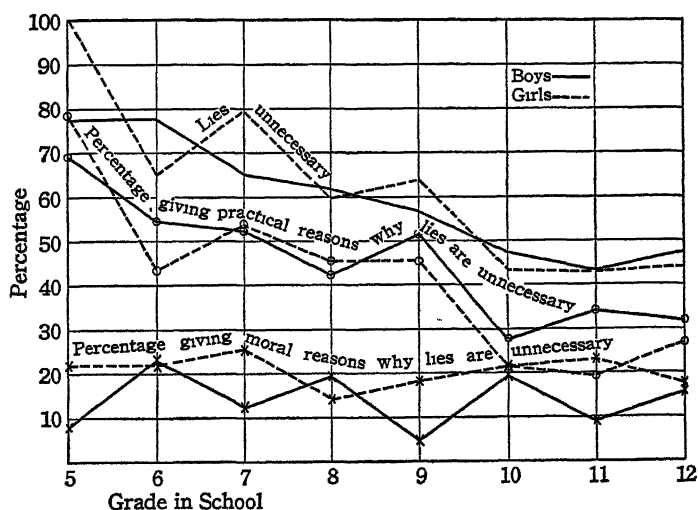


FIG. 132. PERCENTAGE OF CHILDREN ANSWERING THAT LIES ARE NEVER NECESSARY AND GIVING MORAL AND PRACTICAL REASONS FOR THEIR ANSWERS

(Grades 5 to 12. $N = 1415$) (Tudor-Hart) Thus Figure 132 shows that 77 per cent of the boys in Grade 5 believe lies are never necessary, 8 per cent giving moral reasons and 69 per cent giving practical reasons why they are not necessary. Data for Grades 5 and 6 are unreliable because N is so small.

¹² *Pedagogical Seminary*, vol. 33, pp. 586-641, especially p. 613.

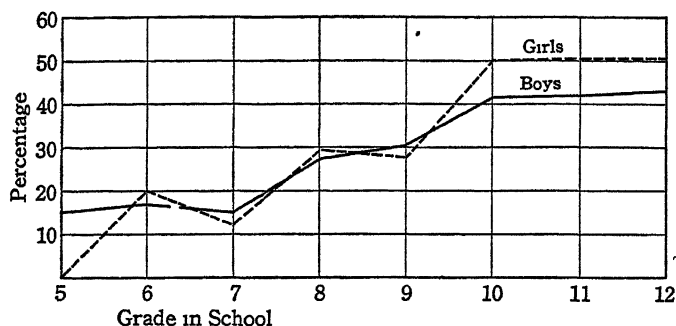


FIG. 133. PERCENTAGE OF CHILDREN, GRADES 5 TO 12, JUSTIFYING LIES FOR SOCIAL REASONS

Data for Grades 5 and 6 are unreliable because so few children gave any reasons.

take the position, or shall he prepare for the examination again and take it over again, or what shall he do?" In grades five and six from two-thirds to all of the children answered "No" to the first question; in grades seven to nine, approximately 60 per cent; in grades ten to twelve, 45 per cent (see Fig. 132). Some age differences also were noted in the types of reasons given, as may be seen from the figure. Many of the children who justified lies did so for various social reasons — to help or protect others, to prepare surprises, and to get out of embarrassing situations. This type of justification was much more common among older children (see Fig. 133). A girl of eleven said, "There is no need for children to lie, but adults have to sometimes." Children's attitudes toward lying seem to change with age, probably because of observing the behavior of adults. They also have less faith in the early lessons taught them and rely more upon their own observations and experience. Too much reliance, however, cannot be placed upon a research based on answers to two questions.

As shown in Figure 134 older boys and girls make better scores on morality tests, but the rise in score with age is found chiefly on tests in which knowledge plays an important part. On the "peeping" test (see p. 401) older children were no more trustworthy than younger ones. Hartshorne and May²³ re-

²³ *Studies in Deceit*, Book I, chap. 7.

port only a slight relationship between age and the tendency toward deceit. The proportions of children aged nine, ten, eleven, twelve, and thirteen who cheated were 23, 35, 33, 37, and 37 per cent, respectively. There is some reason to believe that the nine-year group, which cheated least, did so because of superior intelligence.

These results are discouraging indeed. The older children, subjected to many more years of school and home training, seem to be no more truthful and honest than younger children. Obviously, children learn the practices of adults as well as their preachments. As time goes on, the world of assertion and the world of fact may part company. Further results, in fact, lend support to the view that the actual adult environment of the child is the most effective influence upon his moral development.

Intelligence as a Factor in the Moral Behavior of Children. To ascertain what part intelligence plays in children's morals three procedures have been used. The morals of children of superior intelligence have been compared with those of children having average intelligence, morals being measured by a series of tests and by teachers' estimates. Thus in one study of five hundred thirty-two children having I.Q.'s of more than one hundred thirty, Terman²⁴ found that they surpassed in moral behavior a control or comparison group made up of children of average intelligence. More than four-fifths of them made better scores on the tests than did the average or fiftieth percentile child of the group of normal intelligence. Three-fourths of the former excelled the average of the latter group according to the

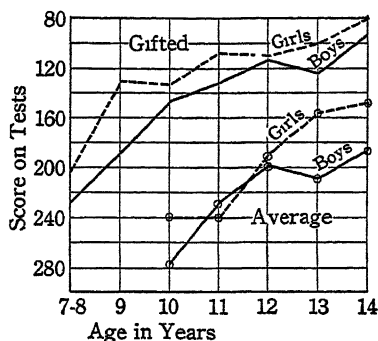


FIG. 134 SCORES OF INTELLECTUALLY GIFTED AND AVERAGE CHILDREN ON SEVEN MORALITY TESTS

(Terman) (Note: lower scores are better)

²⁴ *Physical and Mental Traits of a Thousand Gifted Children.*

teachers' estimates in conscientiousness, truthfulness, sympathy and tenderness, prudence and forethought, and will and perseverance (see Fig. 134). Terman's conclusion that the intellectually superior children excel children of average intelligence on tests of honesty, truthfulness, and similar moral traits may be accepted as a fact, but we must be cautious about inferring that the differences are caused by intelligence alone. If home and other environmental factors are different for the two groups, the difference in scores on the morality tests and estimates may be the result of this factor.

In the elementary grades, degree of intelligence seems to be a factor determining the attitudes of children toward certain laws within their range of interest, as shown in Figure 135.¹⁵ However, they do not differ very much from adults.

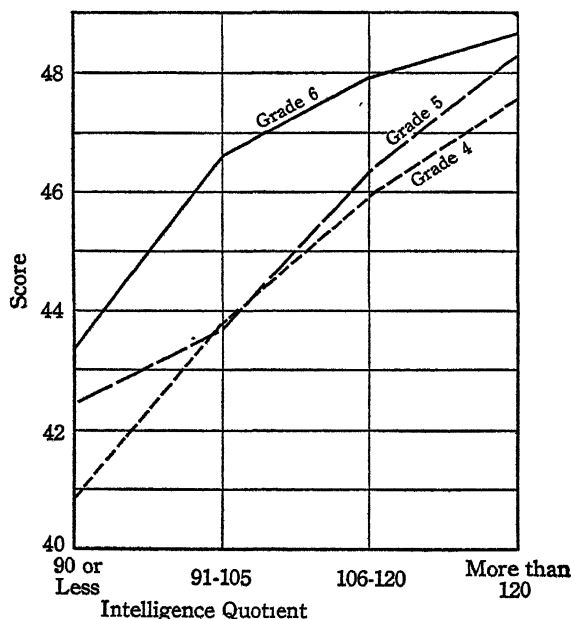


FIG. 135. DEGREE OF INTELLIGENCE AND ATTITUDES TOWARD LAW OF 801 IOWA CHILDREN IN GRADES 4 TO 6
(Lockhart.)

¹⁵ Lockhart, *The Attitudes of Children Toward Law*, pp. 30-33.

Lockhart's study showed that socio-economic status¹⁶ made little difference in the scores of Iowa children on the attitudes test.

The effect of intelligence upon morals has been investigated by considering the proportion of feeble-minded children among delinquents. Burt¹⁷ made an intensive study of two hundred young delinquents in England. Only 8 per cent of them were feeble-minded (I.Q.'s below 70). Healy and Bronner¹⁸ from a study of four thousand delinquents in Chicago and Boston found 13.5 per cent feeble-minded. In the general population the feeble-minded constitute from 1 to 2 per cent of the total. Although these figures show feeble-mindedness much more common among delinquents than among non-delinquents, they must be compared with Healy and Bronner's other figures which attribute 62 per cent of delinquency to bad companions, an environmental factor. Obviously, we cannot infer from such figures that lack of intelligence alone is the cause of bad morals.

More recently, Hartshorne and May¹⁹ found a correlation of $-.50$ between intelligence and the deception scores of nearly three hundred school children (grades V to VIII). This means that the brighter the child the lower his deception score. They also secured measures of the child's home background and made allowance for this by the partial correlation technique.²⁰ The correlation then was $-.40$, again indicating that the brighter the child the less he tended to cheat, even with home backgrounds constant. Home background, however, correlated $-.50$ with cheating scores, also indicating that the better the home background the less the child tended to cheat at school.

The practical conclusion from the facts just presented is that

¹⁶ As measured by the Sim's score card.

¹⁷ *The Young Delinquent*.

¹⁸ *Delinquents and Criminals: Their Making and Unmaking*.

¹⁹ *Studies in Deceit*, Book I, chaps 6 and 7, especially p. 189.

²⁰ The partial correlation technique is a statistical device by which is obtained the relationship between two factors which is freed from the common effect of a third factor. In the case above, the partial correlation coefficient means that the effect of home background was equalized, held constant, or "partialled out"; that is, the coefficient purports to show the relation of intelligence and moral behavior scores (honesty in school situations) for children who have the same home background.

children of low intelligence are likely to make lower scores on tests and estimates of moral behavior. Any theoretical conclusion about a causal connection between degree of intelligence and morals must await more adequate basic data on the problem.²¹

The Effect of Home and Associates upon Children's Morals. Two of the most potent influences determining the child's morals are his home and his associates. Observation and careful investigation both indicate the paramount importance of the kind of supervision by parents and the kind of companions or associates the child has. Studies of delinquencies and conduct disorders²² have brought out the following facts: Eighty-seven per cent of the delinquent girls in one study came from broken homes or homes in which the influence and training were very inferior. In another study, poor training and discipline were regarded as the causes of 90 per cent of the conduct disorders, whereas broken homes were considered a factor in 40 per cent of the cases. Companions or associates seemed to play the major rôle in producing delinquency in several thousand juvenile offenders in Boston and Chicago.

Another approach has been made by finding the relationship between children's ideas of right and wrong and those of parents, friends, teachers, Sunday-school teachers, club leaders, etc.²³ Children's moral knowledge scores were most closely related to those of the parents ($r = .55$), next, to those of friends ($r = .35$), and then, in order, club leaders ($r = .14$), public-school teachers ($r = .06$), and Sunday-school teachers ($r = .002$). The influence of the gang upon the child's behavior has been noted in Chapter XIII. The closer the contact between the child and his companions, the more influence the latter exert upon his conduct.

²¹ For a discussion of the influence of sex, race, and nationality upon the morals of children, consult the references, already cited, to the work of Hartshorne and May, Healy and Bronner, and Vernon Jones.

²² See, for example, Fernald, in *Psychological Bulletin*, vol. 12, pp. 318-319; Healy, *The Individual Delinquent*; Healy and Bronner, *Delinquents and Criminals: Their Making and Unmaking*; Jones, in *Journal of Social Psychology*, vol. 3, pp. 259-282; Paynter and Blanchard, *Educational Achievement of Children with Personality and Behavior Difficulties*.

²³ See Hartshorne, May, and Shuttleworth, *op cit.*, pp. 93-108.

The Effect of School and Church Instruction. Apparently,²⁴ children who attend church schools have slightly better standings in respect to cheating in school, and in regard to helpfulness, than do those not attending, although the causal connection is not known. We cannot be sure of the effect of Biblical knowledge upon moral behavior because the results of recent investigations²⁵ are not in agreement. The mere fact of attendance upon a secular school does not seem to bring about much improvement. Probably the specific experiences which the child has in school, the type of program, and his relations to the teacher and other pupils are of greater importance.

Recreational Activities, Clubs, Camps. The effects of these factors upon the development of interests (Chapter XII) and upon the child's social development (Chapter XIII) have already been considered. Accordingly, little further need be said at this time. Voelker's pioneer work in measuring trustworthiness was part of a larger problem of determining whether boys could be trained in trustworthiness. He found as the result of seven weeks' training in Boy Scout work, with much discussion and emphasis upon trustworthiness, that one group of boys made noticeable improvement. Another group of boys had the Scout work, but without any special discussion of trustworthiness which would tend to make it an ideal. These boys also improved, but not as much as the first group. A third group of boys had no Scout training or other special training. They made the least improvement in trustworthiness. We would expect clubs and camps to exert a powerful influence upon children's social and moral development because of the close, intimate contacts and the group standards which such associations in groups tend to enforce, especially since social approval and disapproval powerfully motivate the child's behavior.

Books, newspapers, and magazines probably have some effect upon the child, although careful experimental evidence is

²⁴ See Hartshorne and May, *op. cit.*, Book I, chaps 18-20.

²⁵ See, for example, Hightower, *Biblical Information in Relation to Character Conduct*; Taylor and Powers, in *Journal of Genetic Psychology*, vol. 35, pp. 294-302.

lacking. Opinion based on clinical and other experience has been voiced to the effect that reading cheap novels of bandit life contributes to delinquency.²⁶ Stories of wild, hair-raising adventure are sometimes regarded as harmless, being a sort of make-believe outlet. Conclusive evidence on this point seems to be lacking.

The Effect of Motion Pictures upon Children's Morals. The influence of the motion picture upon the child's knowledge, emotions, attitudes, and morals has been studied at some length. The results are not in clear-cut agreement²⁷ as to the effect of motion pictures upon moral conduct. Burt and Healy and Bronner attribute a very small amount of delinquency to motion picture attendance. Hartshorne and May find very low positive correlation between picture attendance and scores on cheating tests. A great deal of reliance has been placed in Healy and Bronner's conclusion that one per cent of the delinquency in their four thousand Boston and Chicago cases was attributable to moving picture attendance. We are inclined to give equal or greater weight to the more recent work of Thurstone, and of Peterson and Thurstone in studying the marked changes in children's attitudes toward gambling and toward German people after seeing two pictures, the one depicting gambling, the other the film, *Four Sons*. At least, the later work shows that immediate specific effects may follow certain pictures. We have questioned many boys and girls, ages ten to seventeen, about various films which had certain objectionable features. We have been surprised at the attitude of psychic distance or make-believe which many of them seemed to assume. We feel reasonably sure, however, that, if the producers of films considered the genuine welfare of boys and girls and sought to provide the best wholesome entertainment for

²⁶ Healy, *The Individual Delinquent*, p. 305.

²⁷ See, for example, the following: Burt, *The Young Delinquent*; Charters, *Motion Pictures and Youth, A Summary*, Hartshorne and May, *Studies in Deceit*, Healy and Bronner, *Delinquents and Criminals, Their Making and Unmaking*; Mitchell, *Children and the Movies*; Peterson and Thurstone, in *Journal of Educational Psychology*, vol. 23, pp. 241-246; Phelan, *Motion Pictures as a Phase of Commercialized Amusement in Toledo*; Thurstone, in *Journal of Social Psychology*, vol. 2, pp. 291-305.

this great group of motion picture patrons, the quality of films would be much improved over those produced under activation by the profit motive alone. The moral development of youth is so important that the cooperation of all agencies exerting any influence upon it seems highly desirable.

The Inheritance of Moral Traits. At the present time psychological thought, as well as basic biological considerations,²⁸ give little acceptance to the view that moral traits are inherited or that the child has an innate moral sense. Nature plays its part in providing the fundamental structures by which learning takes place; but in overwhelming degree the child develops his morals through the contacts, experiences, training that he has — through his responses to the situations in his environment.

The Guidance of Moral Training. The principles basic to the development of moral character are essentially the laws of learning which have been described elsewhere in this book. No new principles are needed. Children learn by doing, and the practice of good acts has much more value than have exhortations or rules. At the outset, children perform and learn the actions that are satisfying to their basic motives. If good responses are made satisfying to the child by praise, by social approval, and by their leading to achievement, these reactions will be retained and used in the future. Socially undesirable responses should not be permitted to become sources of satisfaction. To some extent, bad responses may be inhibited by disapproval, but positive and constructive training has more value than negative blocking. The general problem of the guidance and control of child behavior is discussed in Chapter XIX.

5. THE ORIGIN AND DEVELOPMENT OF RELIGIOUS BELIEFS

Religious Ideas Acquired, Not Innate. Modern psychology can find no scientific basis for believing that any of the child's religious ideas are innate. They have the same source as his

²⁸ See, for example, Jennings, *The Biological Basis of Human Nature*.

other ideas and beliefs. Religious attitudes as they develop in individuals are the result of experience, training, and education, in other words, the product of environmental factors.

John Locke (about 1690) discussed the problem of innate ideas and concluded that the mind is a *tabula rasa* or blank tablet upon which experience writes. In the *Essay Concerning Human Understanding* he says, "Let us then suppose the mind to be, as we say, white paper, void of all characters, without any ideas. How comes it to be furnished? Whence comes it by that vast store which the busy and boundless fancy of man has painted on it with an almost endless variety? Whence has it all the materials of reason and knowledge? To this I answer in one word, from experience; in that all our knowledge is founded; and from that it ultimately derives itself." Many who have accepted Locke's view have emphasized the part experience has played but have neglected to give attention to how it plays its rôle. They have overlooked the activity of the learner in all learning. They have thought of the mind as something more or less inert, a wax tablet upon which experience makes its impressions. This seems far from the truth, according to present psychological thought with its emphasis upon the motivation and mind-set or purpose of the learner and his self-activity. Learning is an active process. In religious training, perhaps even more than in secular schooling, the child has been made to "absorb" ideas which he is unable to comprehend, which do not appeal to his interests, and which do not relate to his life. The effective teaching of religion must be based on the general principles of learning which have been emphasized throughout this book.

The Nature of Early Religious Beliefs. The specific nature of the child's early religious ideas and beliefs is determined chiefly by the kind of instruction he has had, although other factors such as his degree of intelligence also are significant. Religious instruction often has emphasized the verbal and formal, and the child gains only stereotyped verbal expressions which mean little or nothing to him because they are beyond his understanding. Even with good instruction the child's ideas often

are confused — in religion as in secular matters — as the following shows: ²⁹

A father was reviewing the day with his young son (age five years and eight months) and in the course of the bedtime conversation said, "What do you know about God?" The lad answered promptly, "Nothing — not a thing." Urged to try to tell something about God, he replied again without hesitation, "No! I don't know anything about God." Asked what he knew about Jesus he said, "Jesus was a famous man." Questioned further he said, "He lived in another country. I don't know where — we sing about the Lord Jesus." Asked what Lord meant he replied — "I don't know. I haven't any idea." Asked about Sunday School he answered, "Sunday School is a place where you sing, and play, and make books — and you learn not to put the covers on upside down." Other interesting statements of children reveal their confused ideas and imagery. A five-year-old back from Sunday kindergarten was trying to share her experiences with a younger brother. She was overheard to say, "Now, Bobby, you know God isn't real. He is like the grass. He's everywhere. But Jesus is real." Another said, "Fairies aren't real, mother, but you know Santa Claus and God are." A little older child with some experience of the depression asked the question, "Why does God let people get hungry, and have no work? We pray to him, don't we?" A ten-year-old listening to the story of the Ten Commandments, where God is represented as saying, "Thou shalt have no other gods before me — I thy God am a jealous God, etc.," suddenly broke in with the comment, "Gee, he thinks a lot of himself, doesn't he?" And another ten-year-old, after listening to a Bible story, queried, "If Eli was such a good man then why were all his boys so bad?"

Instruction which employs words whose meaning is unknown to the child is of little value. Under favorable conditions, the child may have a clearer idea of what is taught him and may develop beliefs and ideas that have some value for habits and ideals of conduct, as well as in religious observance.

Religious Development During Childhood. "During the years before puberty the religious aspects of the child's life are modified in many ways. New religious teachings and new ideas are

²⁹ Chave, in *Character*, vol. 1, p. 8. Quoted by permission of the Religious Education Association, publishers.

a factor, of course, but even more significant are his growing mental powers and his expanded and organized mass of experiences. As a result of his wealth of experiences he is acquiring standards of judging, evaluating, and integrating his knowledge. From his increased mental ability he has greater capacity for judgment and organization. Accordingly, his old ideas and new teachings along all lines are likely to be more critically appraised."³⁰

The Value of Religion for Children. Under favorable circumstances the child's religious experiences may have great value for him. His beliefs may contribute to his feeling of security and be a valuable factor in the development of his moral nature. The child's religion at its best actually may make a difference in his living. Religion here has about the same meaning as for Chave,³¹ who says, "Religion isn't an instinct but it is man's attempt to find the best way of life and to explain the world in the light of the best he finds. The fundamental basis of religion . . . is an emphasis upon the spiritual value of persons."

If religion is to have value for young children it probably will have to be much different from that which has frequently been taught them. We have known in psychology for a long time that children are not small replicas of adults. We have known that even physically the child, at no age from birth to twelve, has the same proportions as the adult. The mental differences are equally great. Immaturity is a real thing, differentiating child and adult. Even if the child uses the same words and forms in religion as the adult employs, they do not have the same meaning and significance. Piaget³² and others have called attention to the unsuitableness of some of the religious instruction often given children under seven or eight years of age, it often being "foreign to the child's natural thought." A verbal formalism may have little value to the child. This fact has been recognized by religious leaders — Protestant, Jewish, and Catholic. It has been urged that the value of religious forms

³⁰ Brooks, *Psychology of Adolescence*, p. 338.

³¹ *Op. cit.*, p. 9.

³² *Language and Thought of the Child*.

and ceremonies lies in their inner significance, and that this inner quality is the very essence of true religion. Thus one writer³³ characterizes the merely formal as "a religion taken up with outward observances — that is to say, with means; a religion which neglects the end, that is to say, virtue. People think they are Christians because they keep in touch with the institution of salvation. They count upon their last hour to establish in goodness a feeble will which has run away from trial up to the very moment when trial is about to end. Even if such presumptuous reckoning does not miscarry, it means a religion which at best helps one to die a good death; true Christianity helps people to live a good life." The child probably will profit most from religious training which is suited to his everyday life with its immaturity and specific experiential and environmental backgrounds.³⁴

6. RELIGIOUS EDUCATION OF THE CHILD³⁵

The effectiveness of the child's religious training is contingent upon applying the important facts and principles of learning in all religious teaching in home, school, or church. A set of standards by Hartshorne and Lotz³⁶ is we believe, an excellent formulation of criteria for evaluating religious instruction in weekday schools and Sunday schools.

1. The pupils show increasing respect for one another and for those with whom their activities bring them into real or imaginative contact.

³³ Mgr. D. Hulst, rector of the Catholic Institute in Paris, quoted by Ross in *Religious Education*, vol. 26, p. 718.

³⁴ For an illuminating account of children's religious ideas and beliefs, see Sweet and Fahs, *Exploring Religion with Eight-Year-Olds*. See also Hartshorne and Lotz, *Case Studies of Present-Day Religious Teaching*, especially chap. 3.

³⁵ For further discussion of this topic consult standard works on religious education and those specific volumes presenting programs suited to the needs of the various denominations.

³⁶ *Case Studies of Present-Day Religious Teaching*, pp. 8-9. Yale University Press. Quoted by special arrangement with the publishers. Those interested in this problem will find in this volume reports of actual observations of teaching religion in week-day and Sunday schools.

2. The pupils are in real situations and are responding to the situations rather than to the teacher, for it is the function of the teacher to bring the pupils into vital relationship with these situations.

3. The situation, while continuous with out-of-school situations, is simplified so as to make possible the maximum freedom of the child without confusion or disaster.

4. The pupils view the situation objectively rather than through their prejudices and emotions.

5. Those phases of experience which are primarily acts of appreciation are so handled as to permit the children to make their own evaluations and to compare their judgments with those of others.

6. In facing new situations, the process of thought is such as to lead to valid conclusions. That is, the scientific method is used.

7. In facing new situations, the pupils make use of relevant past experience, so far as they can gain access to it.

8. Problem-solving includes foresight of consequences of various possible procedures and a choice of one or the other in terms of their believed harmony with the general direction of the life unit or phase of which it is a part. When issues are critical such evaluation takes the form of worship, and is in terms of the value of persons.

9. The conclusion of a project is the occasion of measurement of progress in skill and appraisal of results in terms of objectives. This latter may involve worship when the results are of sufficient importance.

10. The pupil's responsibility includes the experiencing of the results of their experiments as well as the planning of them.

Apparently, children are taught religion most effectively by actual living. The lives of those about them probably influence them more than formal verbal instruction. Parents and teachers are not likely to have much success in teaching children that which they themselves do not believe. On this point many intelligent parents need help from religious leaders. They do not know what to do, for their own thinking has changed their views on some points since they were children. The past twenty years have brought shifts in emphasis with which parents are only vaguely familiar. They are uncertain what should be the relative emphasis in religion upon love and fear. They do not know how to answer many of the questions their

children ask, whether to say what they were taught as children or what they believe now. In fact, they are not sure exactly what they do think. Accordingly, they feel troubled and afraid of making mistakes, and often turn over the responsibility and task to religious teacher, minister, rabbi, or priest. Bible study classes composed of parents have their place, but we are inclined to believe that a good substitute may be found in classes for parents, graded according to age of children, in which emphasis is placed upon what to teach children and how to teach it, provided that suitable religious leadership can be secured to give the needed help.

The enrichment of child life and child personality through significant religious experiences appeals to many persons as a very difficult problem whose effective solution requires their best effort, insight, patience, and wisdom, and is worthy of them as well.

SELECTED REFERENCES

On the nature and meaning of moral character see standard textbooks on ethics. For data on measuring character traits see Hartshorne and May, *Studies in Deceit*; Hartshorne, May, and Maller, *Studies in Service and Self-Control*; Hunt, *Measurement in Psychology*, chap. 22; Symonds, *Diagnosing Personality and Conduct*, especially chaps. 3-6, 8, 9, 14, and *Psychological Diagnosis in Social Adjustment*, chaps. 2, 5.

On children's morals and the problems of character development see Ackerson, *Children's Behavior Problems*, chaps. 9-11, 13, 14; Blanchard, *The Child and Society*, chaps. 5, 8, 9, 13, 14; Blanton and Blanton, *Child Guidance*, chaps. 12, 17-19; Healy and Bronner, *Delinquents and Criminals Their Making and Unmaking* (analyses of causes and chief kinds of offenses); Jones, chap. 11, in *Handbook of Child Psychology* (revised edition, edited by Murchison); Myerson, *Social Psychology*, chap. 21; Olson, *Problem Tendencies in Children*; Stoddard and Wellman, *Child Psychology*, chap. 17. Charters, in *Motion Pictures and Youth*, summarizes an extensive inquiry into the effects of motion pictures upon child behavior.

On problems of religion see the extensive literature on the psychology of religion. See Hocking, *The Meaning of God in Human Experience*; Sweet and Fahs, *Exploring Religion with Eight-Year-Olds*; Watson, *Experimentation and Measurement in Religious Education*, and the literature of the various religious denominations.

CHAPTER XV

PERSONALITY TRAITS: THEIR MEASUREMENT AND DEVELOPMENT

TO UNDERSTAND children well enough to be able to guide their behavior wisely and effectively, it is necessary to know something of the nature of personality. The importance of a knowledge of children's motives, interests, emotions, habits, attitudes, abilities, and character has been emphasized throughout this book. Something further is needed, however. One must know the child as a going concern, as a totality, with all of these characteristics organized as a working whole. This need introduces the problem of personality. In this chapter, an attempt is made to answer these questions: What is the meaning of personality? How can the various aspects of personality be estimated or measured? Can people be divided into types, according to personality? How do the characteristics of personality develop? These are some of the most significant issues in the field of child psychology.

I. THE MEANING OF PERSONALITY

Of all psychological terms, "personality" is perhaps the one used most loosely and inconsistently in popular speech. Recently we observed and recorded its use by a wide variety of people: adolescents and adults, business men, high-school boys and girls, parents, shopgirls, clerks, professional men, mechanics, college students, and stenographers. We found that many use it to refer to personal appearance, especially to one's clothes, to the way of wearing the hair, to facial expression, to the condition of the face or of the hands and nails. Others said that an individual's personality is his ability to get along with people, his social popularity, his intellectual ability, his knowledge, his skill in selling, his stubbornness and strong

desire to have his own way, his moral character, "it," being the life of the party, or his liking for other people. Still other people cite personality as an intangible something that makes one person different from another, or the individual's central or dominant purposes and ideals. Even age was included. Attractiveness to the opposite sex, ability to get along with and be liked by people, and other social traits were most-frequently included. Perhaps the only valuable emphasis in these popular conceptions of personality is that on social functioning. Traits of personality are of especial importance in the social relationships of the individual, as is seen throughout this chapter.

Personality Not an Unanalyzable Entity. Perhaps one of the most popular meanings attached to personality is that which regards it as a final nucleus or core, resisting analysis, a kind of inner essence of the individual which is unitary and cannot be analyzed into constituent elements. According to this view, personality is defined as self-consciousness, spirit, the unconscious, the sub-conscious, a bit of "mind-stuff" or "soul-substance" which exists independent of the stream of consciousness with its thoughts, feelings, emotions, desires, habits, and other activities, but is, however, their integrating force or entity. In recent popular terminology, personality refers to a quality or characteristic of a person which, for want of a better description, is called "it." We are told that this person has "it," whereas some other person does not have "it." Thus used, personality means the same thing as "it," or else "it" is the very essence of personality. When pressed to tell exactly what they mean by "it," people generally say that everybody knows what it means, that it's the quality that enables a person to get along with others, to be popular and well-liked, to be a social success; or that it is an indefinable, intangible something.

One objection to such a definition is that it defines personality as unknowable. To say that many facts about personality are unknown at the present time is one thing; to say that it is unknowable, that it is a final nucleus or core resisting anal-

ysis, is quite another matter. We know too little about human personality to define it thus. To say that an analysis cannot be made requires more knowledge of a thing and its relationships and attributes than we now possess about human personality. The possibilities of extending our knowledge are too great for us to set up a definition which openly assumes and postulates an intellectual impasse. We doubt the practical value of defining anything as a final unanalyzable nucleus or core, eternally intangible and unknowable.

Personality as Integrated Drives, Emotions, and Habits. According to present psychological usage, personality may be regarded as the sum total of the individual's drives, habits, emotions, and ideas; in fact, it may be thought of as all of his traits and tendencies, functioning in an organized or integrated whole.² All of the ideas, feelings, appreciations, knowledge, purposes, motives, ideals, habits, skills, emotions, and attitudes, which the individual possesses or experiences constitute his personality. According to this view, his physical traits, moral qualities, intellectual and mechanical abilities, social characteristics, and religious beliefs are included. The sum total of all his desirable helpful traits and the totality of his undesirable harmful ones as organized or integrated comprise his personality.

Objection has been raised to this view upon the ground that it oversimplifies the matter and includes too many things. We prefer to think of personality as something tangible and knowable and use the term to mean all of an individual's traits as they are integrated.

By integration of personality traits is meant their organization into a unified system or systems. As shown in Chapter XVI, a very important part of integration concerns the motives, drives, and emotions of the individual, the conflicts arising therein, and the method by which the individual tries to resolve his conflicts. Integration implies wholeness or unity, as well as the balance and coordination of habits, drives, knowledge, emotional responses, etc. As we have pointed

² Cf. Watson, *Psychology from the Standpoint of a Behaviorist*, chap. 11.

out elsewhere,² integration does not occur spontaneously or just on general principles, but takes place in respect to something. In guiding and directing the behavior of children, parents and teachers face important and difficult problems in securing adequate integration of traits in respect to worthwhile environmental conditions. Otherwise, the child is ill-prepared for happy, effective living. Poorly integrated personalities are very common among children and adults. In the latter cases the causes usually have their beginnings in childhood. If a child at ten is unduly dependent upon others, or is very much afraid, or has his affections centered too narrowly and exclusively upon his parents, a suitable balance of traits is lacking. One trait may develop out of proportion with other traits and lead to some imbalance. We may think of the overdevelopment of some undesirable trait as the cause of poor integration, but an overdevelopment of or too much attention to some desirable trait may have a similar result, as when a person continuously washes, wipes, or rubs his hands to keep them clean, or fixes his attention too exclusively upon being honest, accurate, or friendly and helpful to others. For the child's greatest effectiveness and happiness proper balance or integration of all his traits is essential.

2. METHODS OF MEASURING PERSONALITY TRAITS

Personality Traits. Since personality is not a single entity, no such thing as a measurement of an individual's total personality is conceivable or possible. Instead, since personality is a composite of motives, habits, and attitudes, it is possible to measure various aspects, phases, and parts of the total. A definable part of personality, such as self-confidence, or dependence, or sociability, may be termed a *personality trait*. These traits may be estimated and measured, even though this procedure is inapplicable to personality as a whole. One present shortcoming of the measurement of personality traits is that the mutual modifying influence of one characteristic upon

² *Psychology of Adolescence*, chap. 1.

another, or the integration of traits, cannot be taken into account sufficiently.

The prevention or elimination of undesirable developmental trends during childhood depends in part upon securing valid and reliable appraisals of various important personality traits. A wide variety of methods is in use at the present time. Some of these are almost worthless, and a few are entirely without value. Often they are used by people who have insufficient skill, as well as by persons who have had careful training in applying them to secure accurate estimates of traits. The number of devices used is so great and the amount of work done to find out their value is so extensive that several volumes would be necessary to give a reasonably full treatment. Obviously, in the few pages at our disposal, we can give only the briefest discussion of a few of the more valuable ones, warn the reader against the unscientific and useless methods, and refer him to the best accessible literature on the subject.

Methods Having Little Value in Estimating Personality Traits. At least five or six means or methods used in estimating personality traits are known by investigation to have little or no value. We have discussed these elsewhere,³ and so give them only briefest treatment here.

(1) *Estimating personality from differences in head and skull formation — phrenology.* In the past, phrenology has been widely used to appraise ability and forecast achievement. The phrenologist, noting the shape of a child's head and any special protuberances thereof, asserted that he could tell what kinds of ability the child had and what his future achievement would be. Proud parents became even prouder when told not to be surprised if their son or daughter achieved very great eminence. The method is used today by persons who from time to time in the cities give short series of lectures or "lessons" on improving personality.⁴ The method is worthless because the ratings

³ *Psychology of Adolescence*, pp. 356-362.

⁴ Cf. Yates, *Psychological Racketeers*, for an account of many of these "fake" systems. The author recently saw a "demonstration" in an auditorium of a leading hotel in Indianapolis by a "super-mind scientist" (according to his own handbills) in one of

are wholly inaccurate and the forecasts are equally erroneous. Brain configurations do not follow the outer contour of the skull; but, even if they did, we could not thus estimate ability or forecast achievement, because the localization of brain functions is not highly specific. Phrenology has no scientific basis, even though some "fakirs," "experts," or "super-mind scientists" may assert vociferously their ability to use it reliably and accurately.

(2) *Differences in appearance and in physical characteristics.* A great many character-reading systems are based upon various biological markings as indicators of traits of character. We have searched the literature on this subject at some length and have failed to find any scientific evidence for the extravagant claims that the personality traits of an individual can be read off from knowing the color of his hair or eyes, the texture of his skin, the shape and size of his nose, mouth, hands, or fingers. Such classic indicators of character as the square chin, the firm mouth, or the intellectual brow, at best, are but inaccurate indicators of the traits we often associate with them. Of course, we may recognize a cretin or some idiots from a brief glimpse, but we cannot select accurately the various grades of mental defectives by merely seeing them, nor can we by a like method arrange a group of children in order according to their intelligence, sociability, or honesty.

(3) *Personality appraisals from photographs.* Judging human personality from photographs enjoys much popularity. It is widely used in selecting candidates for positions. The evi-

his free lectures. Many well-dressed people were in attendance. Many signed up at twenty-five dollars for the twelve one-hour lessons to be given on six successive nights. This man read character and personality at sight. He did insist, however, that a young lady take off her hat so he could see her head before giving her a reading. His knowledge of physiology, neurology, and brain localization is illustrated by his statements that "bad thoughts enter the solar plexus and go up the canal to the brain," that at death "the Ego leaves through the right door of Brahm" — by gesture located at a point near the right pre-central gyrus. When a middle-aged man asked if the development of certain traits involving changes in shape of head took place in older people as well as in young people, the "super-mind scientist" replied that "changes take place just as rapidly but at a slower rate." Apparently these fakirs have some following. The people who attend their lectures are well-dressed, and *appear* to be above the average in social status.

dence at hand⁵ indicates that the low validity and reliability of such estimates make them of little value. The ratings on intelligence are almost as inaccurate as guesses, being from one to five per cent more accurate than chance ratings. By combining the ratings of twenty-five or more judges the results may be as much as fourteen per cent more accurate than guessing. Judgments of neatness, sociability, humor, etc., seem to be even less reliable than those of intelligence. Even though beauty and vulgarity, in one study were estimated slightly more accurately than intelligence, twenty-five to fifty judges are needed to secure combined ratings as much as twenty-five per cent more accurate than guessing or chance.

(4) *Judging personality traits from voice, gait, posture, etc.* Personality is vastly too complex to be indicated accurately by such simple things as voice, gait, or posture. Then, too, these things vary so much with the circumstances under which they appear that little reliance can be placed on them. They seem to have only slight value for estimating a few traits. Various conditions call out different responses or reveal different phases or traits of personality. Accordingly, gait, posture, voice, gesture, etc., are likely to give little information about one's personality traits. A slow, slovenly gait may mean merely that the individual is tired from a hard day's work or hard playing, and not that he is lazy or unambitious.

(5) *Appraising personality from handwriting.* Differences in handwriting are often regarded as reliable clues to personality traits, and elaborate systems for reading character from handwriting have been published and widely used. On the whole, recent investigations⁶ indicate that handwriting is not a very valuable index to personality traits.

(6) *Estimating personality traits by personal interviews.* Studies by Hollingworth and Scott indicate that the interview

⁵ See, for example, Hollingworth, *Judging Human Character*, chap. '3. See also Dashiell, *Fundamentals of Objective Psychology*, p. 307, footnote and illustration facing p. 306.

⁶ See, for example, Hull, *Aptitude Testing*, pp. 147-151; Hull and Montgomery, *Psychological Review*, vol. 26, pp. 63-74; Symonds, *Diagnosing Personality and Conduct*, pp. 525-528.

usually is not worth much in estimating adults' personality traits. They found that experienced sales managers of companies engaged in similar businesses disagreed markedly in ranking applicants for positions. One applicant of a group of fifty-seven was ranked first by one sales manager, indicating that if he were selecting a salesman this applicant would be his first choice of the fifty-seven. Another sales manager, however, ranked this same applicant fifty-seventh; another ranked him second; another, fifty-third. The least variable rankings ranged from second to thirty-sixth for one applicant. We have no reason for supposing that more accurate estimates of *children's* personality traits would be secured by interviews, unless the interviewer uses some kind of check list of things to be sought in the interview. Too often the first general impression persists. As exact methods or prepared questions are utilized, the interview becomes more reliable and valid, because in fact it takes on the characteristics of good testing methods.

The More Valuable Methods of Appraising the Child's Personality Traits. A great many useful means of estimating personality traits are now available. Of especial interest to our subject are those which are suitable for use with children before puberty. Some of these have already been discussed in connection with the measurement of moral character and need no further consideration at this time. The other methods may be divided into three large groups — rating scales, questionnaires, and tests.⁷

(1) *Personality rating scales.* A rating scale is a method for systematizing the expression of opinion concerning a trait. In the case of young children, the ratings are made by parents, teachers, or other adults who know the child who is to be judged. With older children, the child may rate himself, or he may be rated by his companions of the same age. Scales may be arranged in a number of ways. One common method is to

⁷ Those interested in a more adequate discussion of this topic should consult Symonds, *Diagnosing Personality and Conduct*, Symonds, *Psychological Diagnosis in Social Adjustment*; and the Selected References at the end of this chapter. Symonds in *Psychological Diagnosis in Social Adjustment* gives an excellent analytic account of the various rating scales, questionnaires, and tests available to 1934.

compile a list of characteristics, and to direct the rater to check those possessed by the child. Perhaps more useful is the "graphic" rating scale. In employing this method, the rater places a check mark along a line, according to his judgment of the degree of some defined trait which is displayed by the subject being rated. Blanton and Fenton⁸ have devised a graphic rating scale consisting of fourteen traits which may be used to study the child's personality. One of the items of the latter is given below to show the nature of the scale.

SELF-CONFIDENCE *		
EXTREME GROUP ADJUSTMENT		EXTREME EGO ADJUSTMENT
Timid and self-distrustful. Shy, never makes decisions, self-effacing.	Modest but willing to stand up for rights. Able to make decisions. Docile.	Absolutely confident and sure of own decisions. Takes everything as his due.
	IDEAL AVERAGE	
EXTREME		EXTREME
Make		
Cross		
On this line	6 4 2 0 2 4 6	

* From Blanton and Blanton, *Child Guidance*, p. 242. Quoted by special arrangement with the publishers, D. Appleton-Century Co., New York

A graphic rating scale by Cornell, Coxe, and Orleans⁹ seeks to measure nine desirable school habits and attitudes of children and has value for diagnosis of progress. Another valuable rating scale for diagnosis of problem tendencies in children is the Behavior Rating Schedules devised by Haggerty, Olson, and Wickman, to be filled out by teachers. Schedule A, Behavior Problem Record, lists fifteen behavior problems whose frequency of occurrence in each child is to be noted. Schedule B, Behavior Rating Scale, contains thirty-five items to be rated graphically — divided into four groups, mental, physical, social, and emotional. An item from each of these groups is given to indicate the nature of the scale. A cross is

⁸ See Blanton and Blanton, *Child Guidance*, or Fenton, in *Journal of Genetic Psychology*, vol. 35, pp. 546-555.

⁹ *New York Rating Scale for School Habits*, published by the World Book Company.

to be placed immediately above the most appropriate descriptive phrase. The score on an item is the number in parenthesis under the descriptive phrase the rater has marked with the cross.

Items from Behavior Rating Scale:¹⁰

2. Is he abstracted or wide-awake?

Continually absorbed in himself (5)	Frequently becomes ab- stracted (4)	Usually present- minded (2)	Wide- awake (1)	Keenly alive and alert (3)
--	--	--------------------------------------	-----------------------	-------------------------------------

14. Does he lack nerve, or is he courageous?

White-livered, Fearful (4)	Gets "cold feet" (3)	Will take rea- sonable chances (1)	Resolute (2)	Daredevil (5)
----------------------------------	----------------------------	---	-----------------	------------------

18. Is he shy or bold in social relationships?

Painfully self-conscious (4)	Timid, Fre- quently em- barrassed (2)	Self-con- scious on oc- casions (1)	Confident in himself (3)	Bold, Insen- sitive to so- cial feelings (5)
------------------------------------	--	--	--------------------------------	---

27. Is he generally depressed or cheerful?

Dejected, Melancholic, In the dumps (4)	Generally dispirited (3)	Usually in good humor (1)	Cheerful, Animated, Chirping (2)	Hilarious (5)
--	--------------------------------	---------------------------------	---	------------------

An adjustment score card¹¹ by Yepsen is a rating scale or chart to be used by anyone who knows the child. It comprises seventy descriptive items under fourteen chief groups or categories. It gives a measure of the child's social adjustments.¹²

¹⁰ Schedule B, from Haggerty-Olson-Wickman Behavior Rating Schedules. Copyright, 1930, by World Book Company, Yonkers-on-Hudson, New York. Reproduced by written permission.

¹¹ *Journal of Applied Psychology*, vol 12, pp 140-148

¹² Other useful scales are the *Brown Character-Conduct Self-Rating Scale*; F. H. Allport's *North Carolina Rating Scale for Fundamental Traits*; the *Upton-Chassell Scale for Measuring Habits of Good Citizenship*; the Hartshorne and May C E I tests referred to in Chapter XIV; the O'Reilly, Dougherty, and Mannix *Character Analysis Chart*, and the *Terman Rating Scales on Physical, Mental, Social, and Moral Traits*.

Marston ²³ has devised a rating scale for use by parents or teachers in rating children two to six years of age on "introversion-extroversion." The test can be used, however, with children beyond the pre-school ages. Twenty pairs of items, each describing the extreme of a trait, are included. Social or self-attitudes, energy qualities, and emotional tendencies are described. A few sample items are given to show the nature of the test.

- | | | |
|------|--|--|
| (1) | () Is self-conscious; easily embarrassed; timid or bashful. | () Is self-composed; seldom shows signs of embarrassment; perhaps is forward or "bold." |
| (3) | () Prefers group activities, work or play; not easily satisfied with individual projects. | () Prefers to work and play alone; tends to avoid group activities. |
| (9) | () Reserved and distant except to intimate friends; does not form acquaintanceships readily. | () Hearty and cordial, even to strangers; forms acquaintanceships very easily. |
| (13) | () Shows preference for a narrow range of intimate friends, and tends to exclude others from his association. | () Seeks broad range of friendships, not selective or exclusive in games, etc. |
| (18) | () Secretive; seclusive and "shut-in"; not inclined to talk unless spoken to. | () Frank; talkative and sociable; does not stand on ceremony. |

(2) *Personality and adjustment questionnaires.* Questionnaires are of value in diagnosing personality if they are clear, cover significant traits in great enough detail, and are filled out by competent, conscientious people who have time to fill them out carefully. Two kinds of questionnaires are of special interest in child study, those seeking to measure the child's adjustments and interests.

The adjustment or personality questionnaires are attempts to secure useful diagnoses of children's adjustments to various sorts of situations confronting them.

A questionnaire of personal attitudes for boys nine years of

²³ See Marston, *The Emotions of Young Children*.

age and older, consisting of fifty items relating to home and school, has been devised by Sweet.¹⁴ It seeks to measure self-criticism, criticism of others, feeling of difference, superiority, inferiority, deviation from accepted idea of right, and social insight. Symonds adjustment questionnaire¹⁵ contains 150 items of adjustment measured by the pupil's statements of his likes and dislikes. The items are divided into seven groups as follows: curriculum, social life of the school, administration, teachers, pupils, home life, personal. It is designed for use with pupils of the high-school grades, but it is mentioned here because it is suggestive of ways of investigating similar traits in younger children.

Maller has devised a series of character sketches¹⁶ which constitute a questionnaire for discovering introversion, feelings of inferiority, conflict, inadequacy, and compulsion, fears, worries, wishes, and other symptoms of emotional instability. The child marks the statements which describe the way he feels or acts. It may be used as low as the fifth grade. Another questionnaire,¹⁷ designed to ascertain the child's tendency to feel inferior, consists of fifty-nine questions answerable by yes or no. The number of unfavorable responses are determined. It may be used with boys as young as ten years of age.

Furfey¹⁸ has published a revised scale for measuring developmental age, which may be used with boys as young as eight years of age. He defines developmental age as "the progressively increasing and non-intellectual maturity of general behavior which shows itself in the growing child's play preferences, in his phantasy life, in his choice of books and movies, in his ambitions, and, in general, in his whole behavior type." The scale¹⁹ consists of six parts or subtests — things to do, things

¹⁴ Published by the Association Press. See also Sweet, *Measurement of Personal Attitudes in Younger Boys*.

¹⁵ See *Journal of Educational Research*, vol. 21, pp. 321-330; also *Diagnosing Personality and Conduct*, pp. 182-183.

¹⁶ Published by Teachers College, Columbia University.

¹⁷ Described by White and Fenton, in *Journal of Juvenile Research*, vol. 16, pp. 231-245.

¹⁸ See *Child Development*, vol. 2, pp. 102-114.

¹⁹ Published by C. H. Stoelting Company, Chicago. The samples given below are quoted by special arrangement with the publishers.

to be when you grow up, books to read, things to have, things to see, and things to think about. The items are arranged in pairs. The boy chooses in each pair the one he prefers. Thus, he answers questions like these:

“THINGS To Do”

Would you rather

- | | |
|---------------|---------------------------------|
| 1. Dance, | or 2. Play “Puss in the corner” |
| 1. Play golf, | or 2. Play soldier |

“THINGS To HAVE”

Is it more fun to have

- | | |
|---------------------|----------------------|
| 1. A pet rabbit, | or 2. A punching bag |
| 1. A magic lantern, | or 2. A saxophone |

Figure 136 shows the increase in “developmental age” from eight to fifteen years of age, as found by Furfey. An interesting feature of this curve is that it seems to show increased acceleration as adolescence nears, whereas curves which chart the growth of ability (see Chapter IX) usually show negative acceleration in these years.

Another valuable type of questionnaire measures the child’s interests at various ages. Devices of this sort include the Lehman and Witty play check list to which reference was

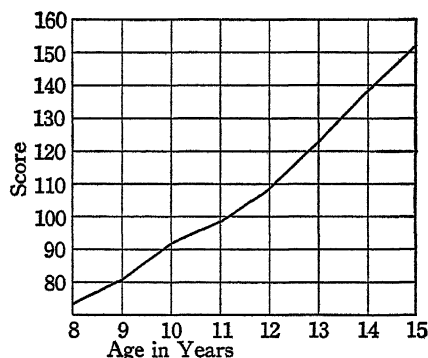


FIG. 136. DEVELOPMENTAL AGE SCORES OF SEVERAL HUNDRED BOYS.
AGES 8 TO 15 YEARS
(Furfey.)

made in Chapter XII. A questionnaire by Terman²⁰ seeks to discover the play interests, activities, and knowledge of children. Watson has devised an interest analysis questionnaire²¹ which may be used with children as young as twelve years. Eighty-five items on various social and cultural activities are checked according to the individual's interests.

(3) *Personality tests.* A test is a more precise measure than a rating scale or questionnaire. Up to the present time, relatively few devices deserving this title have been applied to the study of personality. Tests which measure knowledge, judgment, and attitude on moral and ethical problems have been described in Chapter XIV. There also were discussed the performance tests employed to measure honesty, cooperativeness, and several other moral qualities.

Some of the few other meritorious testing techniques for personality traits are described briefly. Margaret Otis²² has devised a test which is purported to measure *suggestibility* in children. Suggestibility is shown when a subject, because of the directions given, is made to respond other than as he naturally would. Otis's test consists of a number of directions items and may be administered to groups. The ability to resist suggestion increases with age, as Figure 137 shows. Unfortunately, this test correlates highly with intelligence and does not measure the trait of "suggestibility," as separate from intelligence, with any great certainty.

Ruggles²³ devised a *distraction test* to measure the tendency to be distracted from a task by interesting but irrelevant stimuli. Two forms of an arithmetic test are used, one with no distractions, the other with many interesting drawings in the margin and between the problems. If a markedly lower score is made on the second form, distractibility is indicated.

A test that is believed to reveal an important aspect of per-

²⁰ See *Mental and Physical Traits of a Thousand Gifted Children*, pp. 388-393

²¹ By G. B. Watson, "How You Feel About It?" published by the Association Press, New York.

²² M. Otis, *A Study of Suggestibility in Children*.

²³ See Hartshorne, May, and Maller, *Studies in Service and Self-Control*, pp. 308-313.

PERSONALITY TRAITS

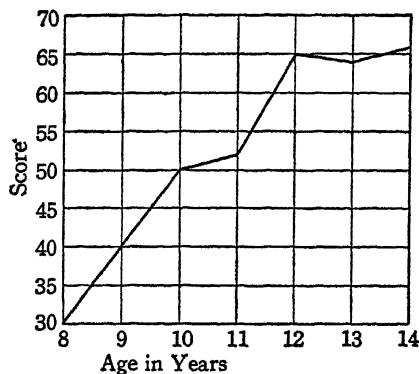


FIG. 137. ABILITY OF CHILDREN, AGES 8 TO 14 YEARS, TO RESIST SUGGESTION
(Otis.)

sonality is the *maze test* of S. D. Porteus.²⁴ In this test the subject finds his way through a printed maze with a pencil. Useful as tests of general mental ability, the maze tests also indicate a difference between those children who are *impulsive* and those who are *foresighted*. The impulsive ones dash down blind alleys, while the more prudent look carefully before venturing.

In general, the various tests of personality traits emphasize the principle that these characteristics differ in *degree*, rather than in kind, among individuals. Persons are not found to possess or to be without certain traits; instead they show a greater or lesser quantity of the trait. The variation seems to be continuous from one extreme to the opposite, with most persons at an intermediate position.

3. THE PROBLEM OF PERSONALITY TYPES

Alleged Types of Personality. Human personalities often are regarded as divisible into a few distinct types, and each person is supposed to belong to one of these classes. One of the earliest classifications was made during the second century A.D. by the Greek physician Galen, who postulated his well-known

²⁴ Porteus, *The Maze Test and Mental Differences*.

four types of temperament, each determined by a certain physiological condition of the body. The sanguine, having a surplus of blood and being warm-blooded, is animated and cheerful; the choleric, having a surplus of "yellow bile," is high-strung, quick-tempered, and irritable; the melancholic, having an unusually large amount of "black bile," is sad and depressed; the phlegmatic, having a surplus of phlegm, is sluggish, dull, and calm.

More recently, many attempts have been made to set up a few types or classes of temperaments into which all individuals could be divided. Individuals, for example, are regarded as introverts or extroverts, positive or negative types, as "tough-minded" or "tender-minded" (William James), as belonging to the schizoid or cycloid types of temperament, corresponding to type of body build (Kretschmer).

Inadequacy of Classification into a Few Types. The chief difficulty met in trying to divide all human beings into a few classes or types of personality is that the great mass of people really do not belong to such extremes. This is illustrated by the well-known classification of people as "introverts" or "extroverts" proposed by C. G. Jung. The introvert is supposed to be one who views life subjectively and values everything according to his own inner life and thought. The extrovert, on the contrary, is externally oriented and bases his values on social considerations and on the opinions of others. Many people are found who seem to fit the definition of introversion, many who are extroverts, but after all individuals have been selected who seem to fit these two types, the majority remain unclassified. We find persons who are primarily of a practical turn of mind almost to the exclusion of "thought." We find others almost exclusively of the artistic temperament. We find persons of intellect with little ability in concrete practical affairs or along artistic lines. All of these, however, constitute but a small proportion of the human race, because the majority do not belong to the extremes. Heredity and environment tend to produce a larger proportion of individuals who are near the average.

The root of the difficulty seems to be this: the qualities characterizing a given type are measurable on a continuous scale rather than merely in a few discrete steps. Introversion probably varies in amount. All introverts are not given equally to introversion; that is, this quality or trait varies from a small amount to a large amount. All that we know about individual differences indicates that individuals do not belong in a few discrete groups, but rather that the amounts of each trait vary among individuals by almost imperceptible gradations from very little to very much of it. The conception of types is useful in cases of disturbances of personality and other extreme cases. In clinical work such classifications are distinctly valuable in diagnosis. Apparently, however, they are not applicable to the great majority of human beings.

Of course, we will find children who are given to introversion and need help to overcome extreme developmental trends. We doubt, however, if much value accrues from assuming that all children of necessity are either introverts or extroverts. It would seem better to use the term introversion-extroversion to indicate a general characteristic of human nature which varies in amount among various persons. This meaning is useful in the next section.

4. THE DEVELOPMENT OF PERSONALITY TRAITS

Many of the important traits of personality that are shown throughout the life of the individual develop during childhood. Quite early in life, the child takes on typical patterns of behavior which become habitual and tend to persist. These personal characteristics are acquired through the process of learning. As the child gains in experience, he learns that some forms of behavior are approved while others are not, that some modes of conduct bring about the satisfaction of his motives while others result in thwarting. / In general, the child repeats and learns those courses of action in which he is approved and successful. Thus he acquires a habit of independence if this is cultivated, or a habit of dependence if he is prevented from

successful self-initiated activity. Some children learn to be sociable if their early trials at social adjustment result in satisfactory outcomes. If, on the other hand, they are rebuffed or unsuccessful, or if opportunities to learn sociability are lacking, children may become seclusive and self-sufficient. By learning from experiences such as these, the traits of personality are moulded.

Although learning is the primary factor in personality development, other phases of child nature also enter into this important process. Children who are bright will learn differently than children who are stupid, even in the same situations. The child who is tall, or large, or strong, or healthy will react to his experiences in a different manner than one who is small, puny, or sickly. In this way physique, intellect, maturity, health, and many other unlearned factors enter into the formation of personality.

The complexity of personality is so great that it is obviously impossible to trace the development of all of its traits. The present section begins by noting the first traces of personality differences in infancy. Consideration will be given to dependence, independence, self-reliance, self-control, ascendance, submissiveness, introversion, extroversion, happiness, and the feeling of security, as representative samples of personality traits which are developed during childhood.

Earliest Personality Differences Observed. The infant reveals some personality differences almost immediately after birth. They are slight, it is true, but they are distinct and may be observed by use of appropriate techniques. With the passing of weeks, the child shows changing patterns of behavior. As we have seen in Chapters IV and XIII, smiling, laughing, and crying are being connected with certain external stimuli by the end of the second month. Just a little later many children make anticipatory adjustments to being lifted. By the sixth month they may show signs of shyness when strangers approach, and signs of joy at the sudden appearance or disappearance of the human head in play. Some children show aggressiveness and persistence at a very early age. Others are

less persistent. Such signs of resistance as stiffening the legs and extreme limpness may be present as early as the sixth month. These are early manifestations of personality differences.

Constancy of Early Patterns of Response. Are the early differences in infant behavior really manifestations of personality differences, or are they merely fleeting and highly variable responses which have no particular significance in the child's personality? Fortunately, considerable evidence is now available showing that these early differences have some permanence. Thus, Washburn²⁵ observed that infants differed considerably in the amount of laughter, smiling, or crying displayed, and that these differences were quite constant from month to month during the first year. They exhibited considerable constancy when observed again during their second year. The infant who smiled, laughed, or cried much or little at one time did so at another time as well. Bayley²⁶ also found a similar consistency in the amount of crying from month to month, especially during the second half of the first year. The results of a study by Bonham and Sargent²⁷ on thirty-eight infants showed little relation between trait ratings of infants at the hospital maternity wards and ratings at the age of twenty-four and thirty months. At the end of two years, good nature, nervousness, and good looks showed correlations of more than .30 (.93, .33, .38, and .42, respectively). Traits such as sociability and initiative showed considerably greater fluctuation and inconsistency. On traits and characteristics such as motor activities, children from two to five years of age may show considerable constancy, but on other traits²⁸ they may show very little. In a period of very rapid development when many stimuli are affecting the child, considerable shifting in relative standings on ratings of personality traits may be expected. Part of the difficulty lies in the fact that the child's

²⁵ *Genetic Psychology Monographs*, vol. 6, pp. 397-537.

²⁶ *Journal of Genetic Psychology*, vol. 40, pp. 306-329.

²⁷ Reported in Murphy, *Experimental Social Psychology*, pp. 209-213, 239-245.

²⁸ See Arrington, *Interrelations in the Behavior of Young Children*.

behavior is highly specific, varying according to the situations which evoke his responses. Consequently, many observations under diverse conditions are needed to give a reliable record of his behavior.

Independence, Self-Reliance, Self-Confidence, and Self-Control. The child begins life as a dependent being, who must be fed and kept warm, comfortable, clean, and dry by others. When he is hungry, cold, wet, or otherwise uncomfortable he makes his discomfort known by crying and thrashing about. The exercise helps to warm him up and may relieve a discomfort arising from a cramped position. If given a chance, he learns in this manner to satisfy some of his primary wants at a very early age. As he grows older he has a more extensive and more effective repertoire of patterns of response which may be used to help him overcome difficulties, discomforts, and other interfering factors. He can take more care of himself and look after his wants to better advantage. He usually tends, therefore, to develop independence and to rely more and more upon himself. This is the normal, wholesome thing. The child should learn to be independent and self-reliant, because his future success and happiness are closely related to the development of these two traits.

Many parents, however, interfere with the formation of these habits by their children. They really keep them dependent by the training and treatment they provide. They are so afraid the child will do something wrong or harmful that they give him no opportunity to attempt things on his own responsibility, of his own initiative, and for himself. When the child is very young, the parent may be afraid that he will make a mess if he feeds himself. When he is a little older, parents believe that the child will not be able to dress himself, or fasten some article of clothing, or take off his rubbers. Accordingly, the parent does these things for the child and prevents his having the joy and satisfaction of self-confidence, self-reliance, and independence that he would develop if allowed to learn by trying. These general traits have to be developed in specific situations. The child needs a vast amount of practice to learn the skills

involved in taking care of himself every day. These traits will not come forth like Minerva, full-grown from the head of a god. They have a developmental history like any other traits, habits, or knowledge. We have observed children of six and eight years who required help from their parents in cutting the meat on their plates, or in breaking and spreading bread, or in pouring cream on their cereal from a small pitcher. Independence and self-reliance are so important that one might like to say that these children would be dependent not only in respect to their meals but also in all other respects as well. However, such is not always the case. Some were dependent in all the things observed, probably because of very close supervision of all activities by the parent. Others, however, were more or less independent in play and other activities. Thus, one little chap of seven, whose mother had to help him cut his meat and assist him at the table, was very helpless in this respect, but he was very independent about crossing streets and refused to hold an older person's hand. He was equally self-reliant in the give-and-take of play activities with older children. While learning is specific, generalized patterns of dependent behavior may develop if the child is kept dependent in a wide variety of situations.

Self-confidence develops from the child's finding by experience that he can do things satisfactorily himself. It is contingent upon his being able to do things well enough to satisfy his standards of achievement. Clearly, then, self-confidence implies ability, and children differ enormously in all abilities. How, then, can we expect a child to have self-confidence when his performance is very poor indeed? With young children much care should be taken that the standards are not too high or too rigidly enforced, lest the child lose confidence in himself because his achievement is constantly less than that expected of him. This is very discouraging to the child and may have bad results, as is seen in the following case.

Miriam W., age nine years, eight months, Stanford-Binet I.Q. 104, ranks ninth in scholarship in a class of forty-five pupils in the average section of the high fourth grade. She is normal

in height but five pounds underweight. She is in good general health except for "nervousness." She has had measles, chicken pox, and whooping cough. She is a very attractive and likeable child, always neat, clean, and very well dressed. Miriam is doing all that reasonably could be expected in school — very good work in the grade and section to which, according to her ability, she belongs. However, she is not happy, but seems nervous and always works under a strain. She fears she may make a mistake and be scolded by her parents for it. She is the school favorite, is not conceited, and has the sympathy of the other children whenever her work falls below perfect. Her teacher says of her. "It is not unusual to see Miriam with an arithmetic paper of perhaps 90, surrounded by a sympathizing crowd of admirers trying to comfort her. Usually the comforters have papers with marks ranging from 40 up, but all their sympathy is with Miriam. . . . Our problem is to stem the tears. She seldom has a day without a bad weeping spell, caused by a recitation or paper graded less than perfect. As she is not a perfect child, there are many of them. We love her too much to see her so unhappy, but we know not how to remedy the trouble, as the fault lies with the parents and not with the child."

The mother and father adore Miriam. The mother is a professional dancer and has planned a dancing career for her daughter. She is very intense in her interest in the child's progress. She wants her to be best in everything she does. Nothing is satisfactory if another child excels her. She visits school continually to find out why some other child's mark was higher than Miriam's, or to tell the teacher that Miriam spent the entire night weeping because her spelling mark was 95 instead of 100. She scolds the child so strongly for the slightest errors that Miriam greatly fears her mother and sometimes corrects her papers before taking them home. The father is a young salesman who is making a good living. He, also, is satisfied with nothing less than perfect in his child.

Miriam has no time for playing with other children or reading at home. On three nights a week she takes acrobatic dancing lessons, and on many other evenings she appears in

public performances. She practices every day after school under her mother's supervision. On one occasion the father whipped her for making a slight misstep in an acrobatic dance done in public.

One may well question whether the high standard of achievement of this little girl will lead to self-confident and independent girlhood. The difference between her achievement and the perfection demanded by her parents may prevent such development. These things are sufficiently evident at present — that Miriam is highly nervous, is very unhappy, and is being prevented from forming important habits of personality.

Other conditions may prevent the child's developing normal self-confidence. Overprotection by the parents, ridicule, too much criticism, and too little commendation are common causes. The child's standards of excellence at first are largely dependent upon others. As he gets older he forms his own standards and normally modifies them more or less throughout the developmental period.

A child never has too much of proper self-confidence or independence. Some children, however, seem to show an undesirable amount of boasting, of making exaggerated claims, and of bluffing. In certain cases, this is due to an excessive amount of praise, attention, and showing-off, which has given the child too great a conception of his own importance. Later, when thrown with persons who will not give him exclusive consideration, this child may have difficulties in social adjustment. In other instances, an apparently undue degree of self-confidence may be a compensatory attempt to cover up a real feeling of insecurity or inferiority. This pattern of behavior is discussed in the next chapter.

The development of self-control in children is closely related to the acquisition of the traits that have just been discussed. The child who is independent, self-reliant, and self-assured needs to learn self-direction and self-control and will need help and practice. We feel sure he cannot learn them effectively without considerable freedom to direct his own affairs within the limits of his expanding capacities.

Mastery (Self-Assertion or Ascendancy) and Submission. Human behavior may be regarded as dominating and submissive. These traits manifest themselves very early in childhood and normally are found throughout life. An interesting study of the origin and constancy of ascendancy and submission as personality traits, made by McLaughlin²⁹ at the University of Iowa, shows the following as probable causal factors in the development of mastery or ascendancy: many social contacts, bearing responsibility at an early age, absence of discipline in the home, parental training, other members of family allowing young child to have his own way, superior physical and mental endowments, and athletic skill. Submissive behavior seemed to have as its antecedents the following: physical defects (either real or imagined), quarreling in the home, friction, ridicule by schoolmates, comparison with others to one's disadvantage, and no opportunity for initiative in the home.

One readily may observe the traits of ascendancy and submission in children of two and three years. They are revealed in the many-sided contacts in the nursery school, in the family group, and wherever else the child is in contact with others.

The only child is usually regarded as being more self-confident and more aggressive than children having one or more brothers or sisters. Popular opinion and the views of many writers on child training depict him as spoiled, egocentric, selfish, jealous, dependent, quarrelsome, and domineering. Fenton³⁰ studied thirty-four only and 163 not-only children in kindergarten and the first six grades of school, using a revision of the Blanton rating scale. *Only* children were slightly more self-confident than *not-only* children, but the two groups overlapped a great deal. *Only* children were a little more aggressive, inclined to bully and have their own way, but the difference was slight indeed since the groups overlapped 90 per cent. In truthfulness *only* children rated almost as high as the *not-only* children; in cheerfulness, slightly higher; in emotional stability, about the same; in modesty, a little below (that is,

²⁹ *The Genesis and Constancy of Ascendancy and Submission as Personality Traits.*

³⁰ *Journal of Genetic Psychology*, vol. 35, pp. 546-555.

only children slightly more conceited and self-assured); in obedience, slightly lower; in initiative there were a few more only children who were high and fewer who were just average.

If further studies confirm Fenton's results we will have to revise our ideas of the only child. We do not mean that the only child presents no special problems. He has many special difficulties, especially those relating to companionship with children his own age, but it may well be that the emphasis upon this matter has made parents of only children quite aware of their special need for careful guidance and adequate child companionship.

Direct and Indirect Satisfaction of Desires. Both children and adults differ in the ways they find happiness and satisfaction. At one extreme is the person who finds them largely in direct realization of desires; at the other, the person who finds them indirectly; between these extremes is the vast majority of individuals. Introverts are those who find satisfaction and happiness in daydreaming or other indirect means and tend to avoid social contacts. They usually are supposed to be self-conscious, to be easily embarrassed, and to spend much time thinking (or daydreaming) before acting. At the other extreme are the extroverts, who find satisfaction in direct realization of desires, are interested in people, and spend little time daydreaming.

Jung describes the extrovert as a person whose behavior is in accordance with objective conditions. Persons and things play a large part in his actions, and he readily responds to the demands of his surroundings. He makes strong enemies and strong friends. He generally is well-liked, gets along well with people, and is little bothered by criticism. The introvert is analytic, self-conscious, is very sensitive to criticism, makes few friends, does not get along well with people, often prefers to be alone, sometimes has strong feelings of inferiority, and does not express his emotions freely. Introversion (Latin, *intro*, within, and *vertere*, to turn) means literally to turn the mind inward upon itself. Extroversion (Latin, *extra*, on the outside, and *vertere*, to turn) means literally turning the mind

outside of itself, that is, on the outside world. These are useful concepts because such differences do exist, as clinical work has clearly shown.

Introversion and Extroversion in Children. Children often live in an imaginary world. They play "mothers," keep school, fight Indians, race automobiles, ride bronchos, run trains, fly airplanes, kill bandits, rob banks, and seek many other adventures—in their imaginations. Are they introverts when they do these things, or should we use some less ominous-sounding word for them, and apply "introvert" only to adults? There is disagreement on what should be included under introversion. Fancy and imagination are taboo to those dour, over-precise, repressed individuals belonging to Gradgrind's school of facts who doubtless would like to see the child's imaginary world tumbled about his head. We prefer to limit the term to those mechanisms by which the individual seeks satisfaction when blocked in the direct realization of desires, especially those indirect means to be discussed in the next chapter. We see no harm in fancy and imagination in children, if they are not confused with reality so as to interfere with normal everyday living.

Marston devised a rating scale³² to measure such emotional responses of young children as might be designated introversion or extroversion. He secured adults' estimates on 56 children, ages two to six years, and observed them in experimental situations designed to test social resistance to a stranger, speed of decision in making choice between several objects, interest in the environment, self-assertion, and negativism. He found that children not only differ in their responses but also are somewhat consistent from one situation to another. If a child expressed himself freely in one situation or was self-assertive, he was likely to respond similarly in other situations; but the consistency was not perfect. Rating scale estimates and experimental test scores showed some agreement, which, however, was far from perfect (correlations from .35 to .58). Mental age, height, and weight were not significantly related to extro-

³² *The Emotions of Young Children.* See p. 432 for a few samples of this scale.

version as measured in this study. Extroversion seemed to be slightly less prevalent among the children five and six years of age than among the younger ones. Boys were slightly more extroverted than girls.

As nearly as we can tell, introversion develops in the same way as other traits. The child whose desire is blocked finds a way out of the situation as best he can. He tries to find a way out that yields some satisfaction and thus relieves the tension set up by the desire or motive. The complexity of the situation and the prepotency of certain elements in it, together with the child's predisposition and possibilities of response as they are functioning at the time, bring about a response. If the response is indirect or imagined and satisfies, the general effect may be for him to resort to such responses on other similar occasions. Thus he may begin to form a habitual mode of response. Obviously, those in charge of child guidance, direction, and control need to be alert to the kinds of responses children are making and to provide or modify situations in order that unsuitable trends may be avoided.

Happiness and the Feeling of Security. Children normally tend to be happy. The little tot of three may sing happily at her play. The boy of six usually finds life satisfying enough and is happy most of the time. Many children, however, are unhappy, while vast numbers of adults are discontented, disillusioned, pessimistic, and unhappy. What is the secret of happiness? Many recipes have been given, and we should not add another. We are inclined to believe, from considerable clinical observation and many case reports, that a contributing factor to the child's happiness is the feeling of security. The sense of security in the case of the young child depends upon the parents or those who have the care of him. As he develops, the feeling of security normally becomes more a function of his own ways of reacting and his own responsibility, with less emphasis upon parental responses. The mature person who has a feeling of security really is willing to accept the consequences of his own behavior. It is a long way from the two-year-old's feeling of security to that of the adult. A shift

occurs from dependence upon others to dependence upon self; from placing responsibility upon others to placing it upon the self; from refusing to accept the consequences of one's behavior to a willingness to accept them. To continue a childish conception of security is a serious handicap to personality. A fully developed and responsible feeling of security is an important personal trait.

Overlapping of Traits. The traits which have been discussed in this section are not separate entities. They exist in varying amounts in different individuals. Furthermore, they show considerable interrelation and some overlapping in meaning, especially in the case of introversion, submission, dependence, the lack of self-confidence, and their opposites. The majority of children seem to exhibit personality traits in amounts which place them somewhere between such extremes as introvert and extrovert. They also show varying amounts of a trait upon various occasions, indicating again something of the specificity of child behavior.

The Normal Personality. It is difficult to make a comprehensive definition of what constitutes a normal personality. The merits and deficiencies of most personality traits are determined by social evaluation, hence traits may be differently esteemed by various groups or at various times. In general, a child's personality is normal if he possesses good traits in sufficient degree and balance so as to get along passably well in his social relationships. The "normal" child is not necessarily the perfect child.

One of the best brief inventories of the characteristics of the desirable personality is that of Rosanoff,³² who enumerates several outstanding features of desirable normality. The good personality shows an adequate power of inhibition against impulsive behavior, and a rational balance, which perhaps is best displayed in following a guiding principle of conduct throughout life. The person of desirable personality has emotional control and stability, consisting in the ability to maintain uniformity and continuity of feeling. He shows

³² In *Psychological Bulletin*, vol. 17, pp 281-299.

superior durability when confronted with thwarting or distress.

These good characteristics arise from the excellence and balance of the personality traits that have been considered here. They define a goal toward which the development of the child's personality may be directed.

SELECTED REFERENCES

On the meaning and nature of personality see Katz, D. in Boring, Langfeld, and Weld, *Psychology*, chap. 19; Dashiell, *Fundamentals of Objective Psychology*, chap. 18; Dockeray, *General Psychology* (revised), chap. 32; Murphy, *A Briefer General Psychology*, chaps. 21, 23; Stoddard and Wellman, *Child Psychology*, chap. 18; Warren and Carmichael, *Elements of Human Psychology* (revised), chap. 14; Woodworth, *Psychology* (third edition), chaps. 5, 6.

On the measurement of personality traits see Eurich and Carroll, *Educational Psychology*, chap. 7; Hunt, *Measurement in Psychology*, chaps. 11, 19; Murphy, *A Briefer General Psychology*, chap. 22; Symonds, *Diagnosing Personality and Conduct*, chaps. 3-9, 12, and *Psychological Diagnosis in Social Adjustment*, chap. 5 and Appendix; Thomas *et al.*, *Some New Techniques for Studying Social Behavior*.

On personality development of children see Blanton and Blanton, *Child Guidance*, chap. 21; Jersild, *Child Psychology*, chap. 11; Shirley, *The First Two Years*, vol. 3, *Personality Manifestations*.

Additional references are given at the end of this volume.

CHAPTER XVI

PERSONALITY ADJUSTMENTS OF CHILDREN

I. THE NATURE OF ADJUSTMENT

WHEN children encounter difficulties, they respond in a variety of ways. The difficulty or problem demands an adjustment, a modification of behavior appropriate to the new circumstances. Some children will adjust by means of really effective responses. They constructively solve the problem, or, if this is impossible, find other outlets for their energies and interests. Other children react to baffling situations in an ineffective manner. If confronted with a difficulty, a child may become emotionally aroused, may strike back blindly and overaggressively, may make excuses, may become stubborn, may withdraw from company and daydream, may become tense and "nervous," or even may become ill as a means of attaining attention and sympathy.

The habits by which persons attack difficulties become crystallized, to a very large extent, during the period of childhood. Many ineffective, unhappy adults are suffering from a lack of guidance, or from improper guidance, in the formation of their typical modes of adjustment. The child's adjustments are, therefore, not only of interest to those who have to deal with him in early life, but also are of great importance for his adult well-being.

In the present chapter an attempt is made to discover the nature of the adjustment process, to understand the factors that determine the making of adjustments, to enumerate the most common kinds of unfortunate adjustments, and to note the relationship between the child's adjustments and his traits of personality.

The Adjustment Process. The process by which individuals adjust to difficulties is one of the most fundamental patterns of behavior. It may be seen in lower animals as well as in

children and adults. The behavior of the hungry stray dog illustrates very clearly the simpler aspects of adjustment. This dog has a need which he is unable to satisfy immediately. Impelled by the drive of hunger, he engages in exploratory behavior. He goes to places where he has been accustomed to find food; he whines at doors; he runs about. Eventually he discovers some food. Now, having eaten, his drive of hunger is reduced or eliminated and the dog is again restored to equilibrium.

Essentially similar is the behavior of the child whose toy has been taken away by another child. He suffers from an interruption or thwarting of a course of motivated activity. The child may try to get back the toy by taking hold of it and by pulling and tugging at it. If unsuccessful, he may strike, push, or scratch the offender. Or, he may snatch one of the other child's toys, or he may give up and turn to a different one of his own. The child may also cry and scream, attracting the attention of others and summoning adult assistance. If all of these measures are unavailing, the child may cry or sulk in disappointment or may show an angry mood for a period of time. In the last-named behavior, he does nothing to further his adjustment, but displays his lack of satisfaction by a continued emotional state.

The general nature of the process of adjustment can be deduced from examples such as these. The individual is impelled to activity by some motive. This activity is subjected to *thwarting*; that is, the immediate satisfaction of the motive is prevented by the prevailing circumstances. Then the individual engages in *varied responses*, which lead eventually to some kind of a *solution* of his difficulties.² The solution may be a good and direct one which really satisfies the motive thwarted, or it may be an inadequate one which gives only partial satisfaction, gains an inferior end, or merely distracts the individual from the original difficulty.

The motives which initiate processes of adjustment are the ones described at length in Chapter XII. The simpler physio-

² See Shaffer, *The Psychology of Adjustment*, chap. 5.

logical motives, such as hunger and thirst, play relatively little part in the adjustments of normal children, however. These basic motives are well satisfied by the care that the child receives and do not underlie problems of adjustive behavior. On the other hand, the strong social motives that are derived largely from emotional reactions are frequently thwarted and give rise to serious needs for adjustment. These motives include the needs for prestige or social recognition, for security, for pre-eminence or mastery, for affection, and also the desire to conform.² Because these motives are strong, because they involve emotional attitudes, and because they are so frequently thwarted, they are basic to many of the adjustment problems of childhood. Of course, adjustments are also made when less fundamental motives are thwarted, as in the case of interference with the child's habits, interests, and purposes.

Thwarting: The Feeling of Inferiority. Many adjustments that children have to make are precipitated by thwartings that are petty, temporary, and easily overcome. Frustrations that are caused by passing circumstances or environmental obstacles, or which operate only in relation to the less important motives, are usually solved constructively. If the end in view is not too important, and if the child realizes that its attainment is prevented by impersonal forces that he cannot overcome, he will often relinquish it without emotional upset or harm.

If the very important social motives are constantly thwarted, however, and especially if the child comes to feel that his lack of success is due to some fault or insufficiency of his own, the result is likely to be quite different. The child who repeatedly cannot satisfy his needs for prestige, pre-eminence, or security may develop an unfortunate attitude of fear, which he endeavors to overcome either by gaining his ends unsocially or by some other undesirable substitute form of adjustment. This attitude is the *feeling of inferiority* or so-called "inferiority complex."³

² See pp. 340-341.

³ Many objective psychologists prefer the terms *attitude of inferiority* or *feeling of inferiority* to the term "inferiority complex," with which they often are used synonymously. The latter term is strongly connected with Alfred Adler's particular system of psychology, whereas the former names have more general significance.

Any conditions which prevent the child from developing self-confidence are likely to help build up a feeling of inferiority. If the standards of achievement and behavior are too high for the child, and if his shortcomings are constantly brought to his attention by parents and teachers, he is in serious danger of feeling inferior. If others make fun of him, or if he has some physical defect or other peculiarity to which attention is called, he is also prone to this undesirable attitude. Thus, one little girl of nine in the fourth grade had no confidence in herself and thought that anything she did in school was inferior to the things done by other children. This was caused chiefly by the high standards held up to her at home, and by the constant ridicule to which an older girl across the aisle at school subjected her. Seated elsewhere near girls who were friendly and kindly she improved very markedly in her attitude toward school and toward herself. The child's problems are real and vital to him, and disparagement by others, especially by older persons, often induces feelings of inferiority. Children in school are in danger of developing feelings of inferiority if the school's demands are beyond their ability. Their environment should provide stimulations to achievement through effort, rather than stimulations to attitudes of inferiority and dependence which often result in an excess of other reactions designed to cover up the feelings of inferiority.

Smith⁴ and Hollingworth and Gray⁵ have carried out studies concerning the nature of inferiority attitudes among older children. From them it appears that feelings of inferiority bear practically no relation to intelligence or school grades, and very little to the relative standing of the home. Boys and girls also show no average differences in this respect. Apparently, then, inferiority feelings are no respecters of persons. The child from the humble home is no more likely to have them than the child from the home of wealth and social position. The causes of attitudes of inferiority, therefore, seem to lie in the particular experiences of the child.

⁴ *The Development of an Inventory for the Measurement of Inferiority Feelings at the High-School Level.*

⁵ *Teachers College Record*, vol. 32, pp. 236-244.

The attitude of inferiority is essentially a fear reaction called forth by failure in social situations. Since strong emotion inhibits a constructive solution of problems, the child with this attitude is especially likely to make inadequate social adjustments.

Thwarting: Conflict of Motives. Another important way in which a child may be thwarted is by *conflict*. Just as the external conflict of one child with another⁶ may thwart desires, so the internal conflict which occurs among the child's own motives may prevent him from making effective adjustments. Each child has learned to react in a variety of ways to the complex stimuli which come both from inside his body and from the external world. Of the many motives that activate his behavior, more than one may be elicited at the same time, and these motives may impel him to antagonistic actions. The child cannot eat his cake and have it, too. If a given complex situation arouses both a tendency to struggle and a tendency to flee, he must do one or the other, for both cannot be done together. The trouble with conflict situations is that they so often fail to evoke a clear-cut decision between the two alternatives. When in conflict, the child vacillates between two courses of action, remains in an emotional state, and neither action satisfies him entirely.

The concept of conflict between motives will be clearer by noting a few examples. If a child has been petted, fondled, and made excessively dependent by his mother, he will be motivated to seek this stimulation. He gains satisfaction from his position as an especially loved and protected individual. Now if this youngster attempts to secure social adjustment among a group of boys, he finds that his attachment to his mother stands in the way. The other boys call him a "sissy" and a "mama's boy." Their attitudes prevent him from asserting his pre-eminence among the group and from securing recognition from it. In this case, the motivation toward his mother may be said to conflict with that toward the boys. Another instance of conflict is found in the child whose parents are at

⁶ Described in connection with Social Development, see section 5 of Chapter XIII

odds, and each of them is trying to win the affection of the child in competition with the other. The child learns from one source to love one of the parents, and from the other source to distrust him. Since he is prevented from developing a harmonious attitude toward his parents, his varying motivations toward them may be said to conflict.

The result of conflicts of the types described is perhaps even more severe than that of thwarting due to an attitude of inferiority.

Defense Mechanisms. If a child is unable to secure a direct and suitable satisfaction of a strong motive because of some kind of thwarting, he is likely to resort to substitute satisfactions. These pseudo-achievements may be regarded as attempts to defend himself from the imputation of inferiority or from acknowledging a conflict, and hence are called *defense mechanisms*. Some defensive forms of behavior are over-aggressive and antisocial, such as bullying, stealing, showing-off, or becoming stubborn. Other children develop defenses that are of a passive and withdrawing nature, such as by day-dreaming, by becoming seclusive, or by identifying themselves with romantic heroes of history or fiction.

Defense mechanisms are adopted because they are partial satisfactions of the motives that have been thwarted, and because they tend to conceal the qualities that underlie the thwarting. Defensive adjustments are poor adjustments, but they are better than none at all. If the mastery and recognition motives of a boy are frustrated because he is too slow and clumsy to play baseball well, he may take to bullying younger children, or to telling "tall" stories of his imaginary achievements in order to secure satisfaction. The strong motives, once aroused, demand activity of some sort. If the more direct and desirable satisfactions are denied, substitute activities are the inevitable consequence.

Adjustment and Personality. A close connection exists between the typical adjustments that a child makes and his traits of personality. If we examine the behavior of a child of school age, we find that his adjustments are determined in

large part by his personality traits. Confronted with the same difficulty, various children will make different adjustive responses. The typical behavior of the overaggressive child, the dependent child, the child who lacks self-confidence, and the introvertive child may be noted. Whether a child adjusts well or poorly to thwarting seems to depend not so much on the exact nature of the problem that he confronts as on the character of his personality.

Upon closer examination of the problem, however, a different relationship may be discovered between adjustment and personality. The present personality traits of the child depend greatly on his habits of adjustment. If, in his past history, a child has succeeded upon a few occasions in adjusting by means of withdrawing, he is predisposed to try this form of response when again he meets with a difficulty. Successful adjustments are habit-forming, just as other successful responses tend to be repeated and learned. The child learns $3 \times 4 = 12$ because this result is confirmed by his experience, because it is praised and designated as "right," whereas other answers meet with disapproval. Similarly, the child may learn to be sulky and stubborn, if he finds that he can attain his ends by this form of behavior, if it is rewarded by the satisfaction of his motives. The individual's traits of personality are, therefore, the outcomes of his habitual forms of adjustment.

As noted in the preceding chapter, traits of personality formed in childhood are likely to be carried into the adult years. The adjustments of children are of more than temporary significance, because as the child learns to adjust, so will the later adult be influenced in his responses to difficulties.

2. INEFFECTIVE PERSONALITY ADJUSTMENTS

A study of the typical inadequate adjustments that children make assists in the understanding and guidance of child behavior. Many otherwise puzzling forms of conduct become clear when they are revealed as inadequate forms of adjustments to difficulties. The simpler maladjustments are shown

by practically all children from time to time — not only by those who present severe problems of conduct.

The classification of the various forms of ineffective adjustment under headings such as compensation, rationalization, negativism, and the like, is required only for convenience in describing them. Most defense mechanisms overlap, and more than one form of aberrant behavior is usually found in the same child. In dealing with actual cases, the classification of a child's maladjustment is of minor importance; the fundamental understanding of his behavior is the really fruitful outcome desired.

Some Maladjustments of Early Childhood. The child sometimes adopts socially undesirable ways of attaining the satisfaction of his motives very early in life, even in infancy. Perhaps the earliest adjustment of this type consists in *attention-getting mechanisms*. If the infant is picked up, rocked, or patted every time he cries, he will soon learn to cry frequently. This behavior is really an example of the adjustment process. Once accustomed to a large amount of handling, the infant is motivated to induce more of the same stimulation. When this is thwarted, he becomes restless and hits upon the expedient of crying. The overfond parents reinforce this pattern by allowing it to succeed. The attention-getting device is a very persistent form of adjustment, not limited entirely to the early years. It can be acquired at any time during childhood and may be seen in the behavior even of adults who talk loudly, show off, or interrupt others when they are not the center of all eyes.

Another very early inadequate adjustment is *thumb-sucking*, which often appears within a few days or weeks after birth.⁷ It is estimated that about two-fifths of infants suck the thumb or fingers to some extent. Some cases are caused by under-nourishment. The hungry infant becomes restless, and by placing his thumb in his mouth makes an ineffective substitute reaction for the normal feeding movements. Proper nourishment may relieve some such cases, but not all. In other in-

⁷ Heering, in *Child Development*, vol. 3, pp. 273-277.

stances even a well-nourished child finds some sensory pleasure in thumb-sucking and will continue it. The vast experience of parents and physicians in attempting to eradicate this response seems to contain little objective evidence on the best methods of treatment. The usual method of restraining the infant's hands works occasionally, but has the defect of being an entirely negative attack, offering no more desirable substitute activity. Placing the child under conditions favorable to relaxation after meals and giving him playthings to occupy his hands may prove valuable, because they are based on more positive psychological principles.

*Enuresis*⁸ is lack of bladder control after the age at which it is usually established. Enuresis may arise from three principal causes. One is a lack of training or inadequate training. That this is very common is seen from the fact that in one group of three thousand children studied (average I.Q. less than 80), nearly one-fourth had not established bladder control by the age of three years. Good training should begin during the first year.⁹ The usual method is to take the child up frequently, and not to allow him to become accustomed to remaining wet. Neglect of this precaution causes many cases of delayed control.

Enuresis is also caused by excessive emotional excitement. The emotional state makes it more difficult for the child to inhibit urination. Consequently, children who are kept excited by scolding or other causes, or who suffer from anxiety or "nervousness" of any origin, may be persistent bed-wetters. The failure to cure enuresis by shaming or scolding the child may result from this emotional condition. In still other instances, enuresis may be a true adjustment mechanism, which the child has hit upon as a means of gaining attention, or as a justification for retaining the status of an immature and dependent individual. The cure of these cases requires both the remedy of the underlying personal maladjustment and careful retraining.

⁸ Ackerson and Highlander, in *Psychological Clinic*, vol. 17-18, pp. 119-127; Benjamin and Laver, in *Journal of Delinquency*, vol. 10, pp. 389-398; Mohr and Waterhouse, in *American Journal of Diseases of Children*, vol. 37, pp. 1135-1145.

⁹ See Blatz *et al.*, in *Genetic Psychology Monographs*, vol. 4, pp. 1-162.

Compensation. The type of defense mechanism that is probably commonest among children (and also among adults) is compensation. This may be defined as an excessive reaction which serves to cover up a deficiency or conflict. Compensations often are fairly direct substitutes for real achievement, hence they tend to satisfy the motives that have been thwarted. Also, they help to distract the individual from his difficulty and lessen the tension engendered by the frustration. Many examples of compensation may be seen in children's behavior. The child who is small or fearful may assume a boastful or scornful attitude; or, prevented from enjoying normal prestige among boys his own age, he may tease and bully younger children. The girl who is socially ostracized may invent elaborate methods of showing-off before the other children or may act in such a way as to imply that she does not want their company.

In many instances a child compensates for an inferiority of one function by the overemphasis of another in which he has a lesser handicap. The lame child may seek to lead at school or may become an avid reader. The dull and stupid youngster who is normal physically often emphasizes his ability in athletics or other non-intellectual pursuits in order to gain his just share of applause. The uncritical observation of these instances is the basis for the erroneous belief that weak children are naturally better scholars, and that dull boys are better athletes. Careful psychological measurement shows that these assertions are unfounded. Dull children are not, on the whole, better athletes than bright ones, but they place more emphasis on their physical accomplishments as a means of compensating for other deficiencies.

Another common type of compensation consists in the development of "peculiar abilities" — that is, uncommon accomplishments in which competition or comparison is negligible. A child who cannot secure prestige or recognition by the usual methods may compensate by becoming a specialist, by knowing more about trees, or butterflies, or postage stamps than do other children, or by developing great skill in some obscure field.

Compensatory behavior cannot be cured by suppressing it, or by "putting in his place" the overaggressive child who shows it. When suppressive measures are applied, the child often fights back and develops even more marked compensations. This form of adjustment must be recognized as an attempt to secure pre-eminence and recognition. Only by providing more socially desirable satisfactions for these needs can compensatory efforts be made to disappear. Of course, all compensations are not harmful. If the child is really handicapped and prevented from normal motive-satisfactions, the milder forms of compensation offer him his only hope for success and may even be encouraged.

Negativism. Another form of defense that is especially common among young children is negativism, a stubborn refusal to comply to social demands, often accompanied by emotional behavior of the rage type. Such a simple form of negativism as a stiffening of the body, or limpness, may be observed as early as the sixth month. Other more complex forms of it, however, are especially noticeable during the second and third years. Negativism is expressed both in verbal and in overt motor responses. Thus, a very bright little fellow of three years, when asked to repeat some difficult words, such as rhinoceros, ornithorhynchus, or daguerreotype, would reply, "Bobby won't say it." If asked, "What won't Bobby say?" he sometimes would reply, "Bobby won't say daguerreotype," or whatever the word was. Finally he caught on and thereafter answered, "Bobby won't say that word." One of the most extensive studies of negativism is that by Reynolds²⁰ who secured extensive information on more than 200 children from two to five and one-half years of age. Thirteen opportunities to resist understood requests were offered each child. The average score was 4.38, with the number of negativistic responses ranging from 0 to 12. The children were asked to stop playing with blocks, or to repeat numbers, or were lifted to the examiner's lap, etc. The younger children were more resistant than the older ones, probably because the latter had a better compre-

²⁰ *Negativism of Pre-School Children.*

hension of what was expected of them and had learned that doing as requested would be more satisfying than refusing. Then, too, the older child is more competent than the younger one in verbal expression. Negativism, according to this study, was not consistently present or absent. A child might be resistant in one situation and not in another, in a situation at one time but not in the same situation at some other time. Negativism as measured by parents' and teachers' ratings seemed to bear no relation to the children's scores on the actual behavior tests.¹¹

Negative behavior in young children is evoked principally by situations which suddenly interfere with their activities, allowing them no time or opportunity to make an adjustment. Thus, a mother was much disturbed at the negativism of her 15 months' old girl who screamed, kicked, thrashed about, and finally stiffened her whole body as the mother picked her up from her high chair to take her upstairs. Probably the significant fact in the tantrum was the mother's abruptness in picking her up suddenly and taking her away. The baby was intently watching the cook rolling out loaves of bread on a table near her high chair. The cook was talking to the baby, playing that she was going to drop a loaf of bread dough, put it on the child's head, or place it on the shelf of her high chair. It was a delightful game for the little girl. The resistance and tantrum were logical outcomes of the mother's abrupt interference. Negativism occurs in specific situations at first, but may later become a general method of reacting to difficulties, a sort of low-grade adjustment. Many things interfere with the child's life as he would like it, and to these he may tend to become resistant. These reactions may be associated with some person who has teased him, or hurt him, or with some situation or place in which he fared badly. The child may learn various ways of being successful in resisting, and hence come to use this response more and more. We have observed cases in which negativism persisted throughout the elementary school years. Teachers, meeting such cases, should try to find the

¹¹ See also, Rust, *The Effect of Resistance on Intelligence Test Scores of Young Children*.

cause and then seek to build up the desired attitudes by securing the child's confidence and cooperation and by providing suitable rewards for social behavior.

Rationalization. A common form of defense mechanism, closely related to compensation, is the irrational process known as rationalization. This is an ineffective form of adjustment in which the individual distorts facts and finds only the reasons which fit in with his personal desires and wishes. Logical considerations and impartiality are disregarded. The reasons given for conduct are not the real ones, but are meant to disguise them. In some cases the individual knows his reasons are "fake" ones, but in many instances he succeeds in deceiving himself as well as others. The most common form of rationalization among children is projection, or "blaming the incidental cause." The child blames his failure or shortcoming on someone else to escape the responsibility or blame. Thus a little girl about three years of age, when asked by her mother to do something she disliked doing, would sit down suddenly on the floor and say with much decision, "Now see what you made me do." Nearly all children resort to rationalization and so do many adults who seem not to have put away childish shirking of responsibility for their own actions. Another form of rationalization is the "sour grapes" attitude, in which the child pretends that he does not want that which is unattainable.

The dangers in rationalization are that the child may form the habit of not bearing the responsibility for his own acts, and that he may make little effort to adjust in a more real manner. Rationalizations originate from the conflict between the child's need for social approval and his other motives. By giving excuses for his actions and for his failures he tries to secure two incompatible forms of satisfaction at once. The cure for the habit of rationalizing is the development of more socialized behavior, so that the individual no longer has to make his selfish courses of action appear to have falsely assumed "good" reasons.

Daydreaming. Thwarted in some strong desire, the child may find a way out of the dilemma by resorting to daydream-

ing. Many children do this, and in their dreams can have highly satisfying vicarious experiences. Daydreams are a readily available form of defense, for whatever the limitations of the child's actual environment, he can rise above them in his imagination. In his dreams he can be healthy, wealthy, powerful, or wise. Fact and fancy may part company, and, living in a world of dreams, the child may rise above the disturbing sordidness or conflict of his actual everyday existence. We need not be surprised that children daydream, or that adults do this also. In his dreams the child can get all the attention and prestige he wants. He can be the hero in a great many thrilling exploits. He may be greatly admired and liked by all. He may be in the limelight as much as he desires. Such a world is in vivid contrast with the world he actually inhabits. He may "identify" himself with some hero in a story, play, or motion picture and follow his adventures in his imagination. He may picture himself a "conquering hero," applauded by all for his fine accomplishments; or he may be a "suffering hero," whose fine qualities, known only to himself, are finally appreciated by others who try to make up for their former lack of appreciation. If he thinks he has been badly treated, the child often will develop this "martyr" type of daydream. Many a little fellow of three or four years who runs a block or two away from home when he feels himself slighted or misused in some way does so with the expectation that folks will be sorry for him and then will treat him as he thinks he should be treated. Or if he is older and imagines himself running away from home, he may have a very enjoyable time seeing in his "mind's eye" all the hardships and sufferings which eventually make things turn out very well indeed for him. Pouting, self-pity, refusals to play or to eat, often are evidence of the "suffering hero" type of adjustment. Even the adult's air of martyrdom may be of like nature.

Daydreaming is not always harmful. If reality and fancy are not confused; if the dreaming is not so satisfying that it takes the place of overt action; if it does not interfere with achievement; if it does not prevent suitable contacts with other

children of his own age and with the outside world — then, within some such limits as these, it is harmless. If the child avoids other children and prefers to be alone in his imaginative world; if he cares little for the games and play activities suited to his age; if he finds it difficult to make normal social contacts with other children — his daydreaming is undesirable. Care needs to be taken lest he find his reveries so much more satisfying than contacts with the outside world that he will seek the former and avoid the latter. The trouble with daydreaming is that it may become a habit and occupy too much time in the child's life. In the world of fancy things come out according to one's slightest wish; in the world of fact, thwarting, defeat, failure, and disappointment are grim realities. Accordingly, it is not surprising that many individuals resort to daydreaming as a defensive or escape mechanism.

Adjusting by Becoming Ill. Children may adjust to thwarting or conflict by assuming the symptoms of illness, which entitle them to special consideration, or which allow them to avoid tasks that they dislike. This pattern of behavior usually arises as a sequel of actual illness. The sick child is often spoiled. He receives more attention and sympathy than when well and is excused from the performance of irksome obligations. It is not surprising, therefore, that the child may endeavor to exaggerate his symptoms to receive the status of a favored and protected person.

Sometimes, of course, the child may merely pretend to be ill in order to secure this kind of adjustment. Parents who are too solicitous concerning a child's health, constantly asking him if he feels well, often may lead him to take advantage of their attitude. If he finds that he can escape chores or school by stating that he has a headache, he will readily cultivate this type of lying, just as he may learn to tell other falsehoods to make life easier.

In other instances, the child's assumed illness has a more fundamental basis than sheer lying or pretending. If the child feels severely thwarted, especially if he lacks proper feelings of security, recognition, and affection, he may genuinely feel

miserable. This, at first, is due to the physiological effects of a strong emotional state of distress. It is very easy for him to interpret this inner misery as an illness, especially if the acceptance of his status as a sick child brings him the attention and consideration that he craves. In such cases the child is innocent of any deliberate malingering, being unconscious, in the descriptive sense of this word, of the sources of his symptoms.

Adjustive illnesses among children are extremely common. The "nine o'clock headache" is a frequent instance. When it is time to go to school, the child may act quite ill, but he recovers promptly when allowed to play. Other ailments of this class take many forms. One typical example is of a boy of six who was recovering from a mild case of whooping cough. Even when he was nearly well, he used the cough to avoid doing any chores. If asked to do something he disliked, he would have a vigorous seizure of coughing, whereupon an older brother would be required to do the task.

If children are allowed to develop illness as a means of defense or escape, they may grow up into plaintive, hypochondriacal adults who are always "enjoying poor health" and seeking sympathy because of their complaints. The best preventive is a positive emphasis on good health. The child should not receive excessive attention during real illnesses, and these times should not be made too pleasant. He should be taught to look forward to complete recovery when his privileges will again be fully restored. In this way, health comes to have more satisfaction value than illness. Of course, it is also necessary to give the well child his due share of attention, love, and security, so that he does not have to become ill to gain these things.

Anxiety and "Nervousness." Children are sometimes found who are constantly anxious and generally fearful. Such children are often described as "nervous," being erratic, "jumpy," irritable, and given to outbursts of weeping. This condition is understood most clearly as a persistent emotional reaction resulting from non-adjustment. If a child is thwarted or subjected to conflicts in relation to his strong motives of pre-

eminence, recognition, or security, he usually finds some substitute adjustment. Some children, however, fail to find any adequate outlet, either because of the conditions under which they live, or because of their past training. These unfortunate youngsters, therefore, are confronted with strongly motivated situations in which they are completely baffled. The result is the maintenance of an unreduced emotional state of the fearful type, which is the typical reaction to situations in which persons are utterly unable to adjust. The symptoms of anxiety and so-called nervousness arise from the emotional turmoil.

Anxiety is especially likely to develop in children whose homes are the scenes of emotional outbursts, and who are constantly stimulated to excessive emotional reactions by the quarrelsomeness or erratic behavior of their parents. Anxiety also commonly results from conflicts that the child cannot resolve. If he loves his parents, but feels insecure in the possession of their affections, or if he is treated with an effusion of love at one time and with harshness at another, he remains emotionally stirred up and hence generally fearful.

Nervousness in children is commonly assumed by parents to be an organic condition, due to "weak nerves." Real diseases of the nervous system exist, of course, but these are serious disorders not to be confused with ordinary "nervousness." For parents to believe that their nervous child suffers from a physical disorder is comforting to them, because they are thus excused from blame for the conditions. This belief is usually incorrect, however, for the ordinary type of nervousness is an emotional phenomenon, presenting a problem that is chiefly psychological rather than medical. If parents constantly assert in the child's presence that he is "nervous," he may be induced to act the part or may use it as a means of gaining his ends, just as he uses other apparent illnesses, as described in the preceding section. The child described as nervous often suffers only from bad training and lack of emotional control.

The cure of anxiety and nervousness in children who have already acquired these reactions is by no means easy. It has been found helpful to provide quiet, orderly routines of life for

them, to remove or prevent causes of emotional stimulation, and to help them to respond more constructively to their difficulties and handicaps. The most fundamental cure is the removal of the more serious thwartings or conflicts to which the child is reacting nonadjustively.

3. ILLUSTRATIVE BEHAVIOR PROBLEM CASES

The following brief case studies have been selected to show some of the less serious adjustment problems met in home and school. We have not included any in which the child had difficulty in doing the academic work of the school. The diagnosis and remedial treatment of learning difficulties are very important, but the schools usually are alert to such problems. Teachers receive considerable training for handling such problems as part of their preparation for teaching. The best schools regard diagnosis and remedial instruction in the various elementary school subjects as matters of regular routine. Accordingly, the emphasis here will be on problems of personality, emotion, and adjustment among mentally normal children.

Violent Temper. Williard W., aged nine years and two months, I.Q. 104, in good health with no physical defects, was in the high fourth grade in a section of average ability. On the Stanford achievement tests he was at high third-grade level, but was at fifth-grade level in arithmetic. He liked games requiring much physical activity, such as skating, bicycle riding, football, baseball, and wrestling. He was well-dressed, neat, and clean. Williard's problem was that he had been troublesome throughout his school years because of an ungovernable tendency to temper. In a fit of temper he bit the kindergarten teacher's finger. His brother two years older than he also had a bad temper. An older sister in a temper tantrum used to lie on the schoolroom floor and scream. His teacher thought Williard a bully, because he always was fighting. However, he did not confine his fighting to smaller boys, but fought boys of his own size and larger as well. He was very stubborn and most of the time had a scowl on his face. When he was not in a tem-

per he was really kind-hearted. His mother was quick-tempered and easy-going and allowed the boy to do as he pleased. A physical and medical examination by a physician revealed nothing wrong with his health or physical condition. The mother would not cooperate with the school for a long time. She took his part in all disputes without finding out the facts, even refusing to allow the teacher to explain his trouble. The father was mild and meek. He was never seen at school and apparently had little to do with the boy's management and training. It required the best part of a year for his teacher to get him reasonably well over having tantrums. She was even-tempered, firm, persistent, fair, impartial, and tried to get him to understand and overcome his trouble. It took these qualities, because he could be so slow and stubborn in meeting the school's demands. However, if a tantrum kept him from finishing in time to devote a free period to handwork and clay modeling which he greatly enjoyed, he was made to give up this activity. If a tantrum prevented his getting through by the close of the afternoon session, he remained after school to finish his work. Gradually he improved and did his work more promptly in school so he could have free time for other things. The corrective program involved a great many other factors, especially getting him to like and be liked by other children.

Nervousness, with Many Emotional Ups and Downs. R. S., a very pale-looking fellow of six years and five months of age, was in the first grade. His general health was not good, and his sitting posture and carriage were poor. He walked with head slumped forward. He had adenoids and bad tonsils which later were removed with a noticeable improvement in health. R. S.'s most pronounced symptom was "nervousness." At first he was very fearful that he would make some mistake. He had no self-confidence and seemed afraid to try to do anything. His first mental examination showed an I.Q. of 87, but it was not correct. His first-grade work showed much more ability. On the second mental test (Stanford-Binet) given after he had been in school four months, the I.Q. was 112. This was more consistent with his good ability in reading. The

first test results were too low, probably because of his nervousness. He was timid, doubtless because of too much mothering. He was the youngest child, much younger than his two brothers and sister, and was babied by his mother. He was allowed to sit on the porch and watch other children play, but he was not permitted to play with them. His mother took him to and from school each day, although he preferred to go by himself. She had much to say to the teacher and in his presence about "upsetting his little nerves." As the year went by, he began to be more aggressive and less timid and showed some temper from time to time. He pouted or sulked whenever corrected. Any success or commendation put him in high glee, but the slightest failure or criticism made him very despondent. He wanted to play games, especially strenuous running games on the playground, but the other children, because of previous experiences with the mother in the neighborhood, did not care to let him play with them. He even bribed children to let him play with them, offering them a marble or some special badge or button they might like. His later development of aggressiveness was but a natural defense mechanism aroused by the situation which was so distasteful to him. He was seeking happiness along lines natural to children of six and seven years — play and companionship with other children. He had been an emotional outlet for his mother whose ideas of *his good* were primarily for her own emotional satisfactions. He needed less mothering and more chance to develop independence and self-confidence in normal contacts with other children.

Lying. H. M., aged twelve years and one month, was normal in height and weight. His health was good, and a medical examination revealed no physical defects. His Stanford-Binet I.Q. was 114. He was doing good work in high sixth grade, his arithmetic work being especially good. He played baseball on the school team and liked to play other games with boys and did so whenever he had the chance. In his neighborhood there were no boys, so he often played with girls. His parents were poor and uneducated. This boy's one serious behavior problem consisted in fantastic lying. There seemed to be no reason that

the teacher could find for his storytelling. His ideas of property rights were also somewhat vague and hazy. Upon closer investigation and analysis by the school psychologist his falsifications seemed to be partly compensatory for feelings of inferiority which were developing concerning his home and parents. He was beginning to get into the homes of some of the boys with whom he played a great deal. The contrast with his own home and parents was beginning to bother him. His lies had an element of bravado and seemed to show overcompensation.

Timid, Afraid, Dependent. G. M., aged eleven years, Stanford-Binet I.Q. 88, was in the low section of fourth grade. Her health was good but vision was poor, necessitating glasses with very thick lenses. Her teeth were in bad condition, but she was afraid of the dentist. She was unattractive in appearance, and her clothes were unbecoming. Her parents realized she was below average in intelligence and took out their disappointment by taunting her about it. They punished her whenever she brought home a paper marked low or failure. She spent most of her out-of-school time taking care of a younger sister. She was self-conscious, timid, and very easily frightened. She seemed dull and uninterested. She was dependent and afraid of teachers and school visitors. She had no initiative and took no part in the social and play activities of the school. She seemed cowed all the time. She spent much time staring absent-mindedly at the teacher. She asked again and again to be excused from games and allowed to do some work instead, such as cleaning blackboards or watering flowers in the classroom. When called upon to recite, her voice after the first few words dropped to a barely audible whisper, given in a timid, hesitating, frightened manner.

Daydreaming. Arthur L., aged ten years and three months, Stanford-Binet I.Q. 132, in the best section of the high fourth grade, ranked twenty-fifth in scholarship among a class of forty-five pupils. In mental ability he ranked second. His health was good, and his physical development normal. He was stubborn, quiet, slow-moving, not inclined to fight, but apparently

not afraid. He seemed embarrassed when commended for a good piece of work. He was a good-looking boy, but his face much of the time had a blank expression as he was lost to the world about him, engrossed in some dream, which he never told to anyone. He did not get along well with other boys. He had been interested in baseball a few times, but being unable to play well and not being able to cooperate with other boys, he soon gave it up. He did not like to have boys tell him how to handle ball and bat or give him instructions on other points of the game. His mother had no control over him and disliked having responsibility for correcting any of his faults. His father was quiet, quick-tempered, made a good living as an accountant, but did not want to have anything to do with the boy's guidance and control. The boy had an older sister and a younger sister whom he disliked heartily. He had much care of the younger one and resented it. As a little fellow he did not have many opportunities to play with other boys. He spent much time in school daydreaming. He might seem to be looking at the teacher and yet be completely oblivious to all that was going on, not even knowing that a question had been asked him. He loved reading and spent all his spare moments in school and out reading books. On one occasion he was so absorbed in a story that he did not hear the other forty-four children leave the classroom at dismissal time, and finally looked up in a startled manner, asking where they were. As a little fellow at home he was left much to himself, was not held responsible, but was permitted to do much as he pleased. Apparently, he never had to live in the present, but was allowed to find satisfaction in the world of fancy which his vivid imagination and bright mind constructed.

4. THE HOME, THE SCHOOL, AND THE CHILD'S PERSONALITY

Upon the parents, the school, and various other community agencies falls the task of guiding the development of the child's personality traits and his habits of adjustment. Some further

evidence as to the importance of the home and the school in adjustive behavior is cited here. Positive principles for child guidance are included in Chapters XVII and XIX.

The Parents' Responsibility. The chief responsibility for the child's personality development rests upon his parents because they exert the most profound determining effect upon him. Bad home conditions have been found¹² to be an important causative factor of children's incorrigible acts. In one study three of the six most frequent causes related to the family. They were lack of supervision and discipline (frequency 147), friction at home (62), and low moral standards in family (62), having a total frequency of 271. The other three causes and their frequencies were lawless companions (147), dullness (112), and other undesirable environmental influences (69). Parents' attitudes have been found to have more influence upon the child's personality adjustments than does the physical environment. Francis and Fillmore,¹³ from a careful study of children living in two widely differing areas of a midwestern city, concluded that the attitudes of parents have much influence upon the child's personality. One group of children lived in a congested slum section of the city; the other group, in a wealthy suburban section. They found that the health of parents, the furnishings and upkeep of home, the degree of knowledge of the child's schoolmates, allowing the child much freedom in going away from home with other children and in recreational pursuits, allowing him the use of spending money as he pleased, watching the child's health, and giving care to his religious upbringing, were significant.¹⁴ The combined effect of the factors which reflected parental attitudes was greater than that of factors which constituted the physical environment.

Francis and Fillmore also cite two illuminating instances. In one family the mother nagged the children and the father spoiled them. The boy was the older child, and both father

¹² See Williams, *Causes of Social Maladjustment in Children*.

¹³ *The Influence of Environment upon the Personality of Children*.

¹⁴ *Op. cit.*, pp. 41-42.

and mother united to influence his development according to a certain pattern. The girl was younger and regarded as too young to worry about. The net result was that the boy was tense and unhappy, whereas the girl was free and had much independence. The other case involved two families on the relief rolls. One had been on the verge of starvation for two years, but the spirit of the parents was helpful. The children were doing good work in school, had many friends, and used their spare time in constructive ways. The other family worried about further relief; open strife was in the home; and the children tended toward delinquency. From these and other studies it seems reasonably well established that home influences are of paramount importance in the development of the child's personality. How well his parents are adjusted seems to be one index of how well the child will be adjusted. Obviously then, parent education is of vital social importance, if parents are to provide right influences for their children.

The School's Task. The school's responsibility is second in importance only to that of the home in guiding the child's development. In general, the school is quite conscious of its responsibility. Teachers usually recognize the fact that the "whole child" goes to school and that the work of the school relates to more than mere intellectual training. And yet, with the mass of pupils each teacher must instruct, the crowded curriculum offerings he must cover, the inadequate training of many teachers, the frequent lack of suitable equipment and play space, and the general public's demand for much of the traditional education, the classroom teacher may become so engrossed with scholastic problems as to overlook behavior or personality problems. Some studies have been made which throw light on this matter. Wickman²⁵ had teachers make lists of children's conduct which they had observed as teachers and which they regarded as undesirable. He had them rate their pupils on various kinds of behavior listed in rating scales. He had them record their judgments of the seriousness of the kinds of behavior referred to on the rating scales. Then he had

²⁵ *Children's Behavior and Teachers' Attitudes.*

thirty mental hygienists and clinicians express their opinions on the seriousness of these same items of behavior. He found that the teachers placed great emphasis upon non-conformity. He says,¹⁶ "The problem child in school is identified by the teachers as one who is antagonistic to authority, does not conform to classroom order and routine, does not make the expected application to school work, and violates the teachers' standards of integrity." This is supported by the fact that the six most frequent problems reported among 874 elementary school children in Cleveland were whispering, inattentiveness, carelessness in work, "tattling," disorderliness in class, and interrupting in class. Teachers regarded immoralities, dishonesties, transgressions against authority, as much more serious than shyness, sensitiveness, unsocialness, fearfulness, and other traits associated with withdrawing recessive personality traits. The clinicians regarded unsocialness, suspiciousness, unhappiness, depression, resentfulness, and other withdrawing personality traits as most serious, whereas they regarded as of least significance such traits as whispering, smoking, interrupting, disorderliness, and profanity. The teachers regarded "compliant, submissive, dependent behavior as more desirable than aggressive, experimental, independent behavior," whereas the clinicians' judgments were almost the opposite. Whose judgment is best? We are inclined to believe that the child's future effectiveness and happiness are more dependent upon aggressive, experimental, independent behavior than upon submissive, dependent, withdrawing behavior. The classroom teacher, however, often is required by public opinion and by the pressure of the miscellaneous mass of children in her care to put major emphasis upon discipline and book learning. If the community wants schools in which adequate provision is made for the development of the child's personality, it probably will have to make notable extensions in equipment, play space, general provisions for health, qualifications of teachers, and the other factors fundamental to good modern schools.

¹⁶ *Op. cit.*, p. 77.

SELECTED REFERENCES

For general discussions of personality adjustments and maladjustments see Dunlap, *Elements of Psychology*, chap. 12; Eurich and Carroll, *Educational Psychology*, chap. 13; Gates, *Psychology for Students of Education* (revised), chap. 7; Goodenough, *Developmental Psychology*, chap. 25; Morgan, *Psychology of the Unadjusted School Child* (revised), chaps. 2, 5-11, 13, 14, 16; Rock, in *Educational Psychology* (edited by Skinner), chap. 20; Shaffer, *The Psychology of Adjustment*, chaps. 5-10; Trow, *Educational Psychology*, chap. 4. Additional data on personality maladjustments may be found in Campbell, *A Present Day Conception of Mental Disorders*; Moore, *Dynamic Psychology*; Sachs and Hausman, *Nervous and Mental Disorders from Birth through Adolescence*; Wallin, *Clinical and Abnormal Psychology*; and other similar volumes.

On maladjustments of children see Baker and Traphagen, *The Diagnosis and Treatment of Behavior-Problem Children*, chaps. 6-10; Hollingworth, *Educational Psychology*, chap. 20; Kavin, *Children of Preschool Age*, chap. 7; Morgan, *Psychology of the Unadjusted School Child* (revised), chaps. 3, 8-11, 14; Scheidemann, *Psychology of Exceptional Children*, chaps. 10, 11; Stoddard and Wellman, *Child Psychology*, chaps. 15, 16; Wickman, *Children's Behavior and Teachers' Attitudes*, chaps. 3-7.

See also references at the end of this volume.

CHAPTER XVII

CHILD HYGIENE

Happiness is the most powerful of tonics. — HERBERT SPENCER.

What the best and wisest parent wants for his own child, that must the community want for all of its children. — JOHN DEWEY.

ALTHOUGH the child is a living organism whose structures and functions are highly integrated and interdependent, yet we may divide child hygiene into two branches, the one relating to his physical health, and the other to his mental health. These two branches are closely related, as is readily seen upon considering the problems and programs of each.

I. THE NEED FOR EMPHASIS ON HYGIENE

A brief survey of the living conditions under which children grow up and of their status in respect to malnutrition, sickness, physical defects, mortality rates, unhappiness, and preventable mental maladjustments indicates the need for a more effective emphasis upon child hygiene than has been made in the past.

Unsatisfactory Dwellings and Food. Children spend their early years at home. Accordingly, the dwellings and grounds should meet certain minimum standards in respect to sunshine, fresh air, pure water, safety, proper sanitation, cleanliness, temperature control, and convenience. Every room should receive sunshine. Preferably, each child should have his own room where he can have freedom from too many adult restrictions against his own legitimate activities. He should have sleeping quarters that have ample fresh air and are quiet enough that he may have the sound sleep he needs and at the hours best suited for him. Dwellings on noisy streets or on through traffic routes are less desirable because of noise, danger, and air pollution from gasoline fumes and smoke.

Even such minimum standards are far from realization now. The progress of the past twenty-five years has improved conditions very materially, and at present some notable attempts are being made to eliminate the worst slum sections in a few of the larger cities. An enormous task remains to be accomplished before each child will have decent living quarters. In times past a great amount of publicity has been given to the slums of the cities. No one denies that they are bad, inexcusably bad, if we really care for the health and happiness of children. Such crowded, ill-smelling, dark, ugly, unsanitary places are not fit for human habitation, and yet large numbers of children live in them. Almost all of the standards of hygiene are violated when a family of six or eight live in a one- or two-room rear tenement, with no trees or grass about and with parks and playgrounds almost inaccessible except on occasional Sundays and holidays. Considerably less publicity has been given to the unhygienic dwellings in the smaller cities and towns, and yet very bad living quarters may be found in rural communities, towns, and small cities. Of course, a distinct advantage of the child in the smaller community is that he is not hampered very much in finding play space, even though it be poorly adapted to his needs. He is likely, however, to be at a distinct disadvantage in other respects.

The water supply of smaller communities is generally not as safe as that of large cities. Private wells may be improperly protected from surface water or other contamination and in the small community the responsibility is often an individual matter. The milk supply in smaller communities often is improperly safeguarded. Pasteurized milk is the rule in the large cities and metropolitan centers. Careful inspection of the milk supply and its distribution is a regular practice. In many smaller communities pasteurized milk is not obtainable, and filthy dairies can be found readily enough. Food inspection is generally ineffective or lacking in the smaller communities, with, of course, notable exceptions. True enough, food inspection may become perfunctory in the cities from time to time. In all these matters, the need of intelligent, informed

public opinion is apparent. Parents and all others interested in the welfare of the child need practical knowledge of child hygiene. Ignorance lends itself to laxity as much as does indifference. A food dealer in a large Eastern city was selling an adulterated product. The law provided that it could not be sold unless its being adulterated was indicated plainly. He was notified of this fact by an inspector. He placed a sign in his window which said in large letters "This product is *highly adulterated*," whereupon his sales increased very materially. Adequate guaranties are needed that food, drugs, and other similar products shall conform to specified minimum standards. This can be secured only through a strong public opinion based upon knowledge of the essential facts.¹

Unsatisfactory School Buildings and Grounds. School surveys show that many schools do not meet desirable standards as to buildings and grounds. Poor location of the site, inadequate playground space, and improper ventilating, lighting, and seating are the most common defects. In cities, zoning ordinances are bringing about improvements, but it takes years to accomplish changes in character of a given section which was part industrial, part commercial, and part residential when the zoning regulations went into effect. Schools have to be relatively close to the children. In many cases, because of lack of effective zoning practices, school buildings have to be maintained on sites which are expensive, small, and not at all suitable for a school. One needs but to investigate this matter to see how difficult it is to provide suitable hygienic buildings and adequate playgrounds for schools in certain sections of large cities. School surveys have attempted to set up for communities long-time plans for developing adequate housing programs for the schools. They have brought clearly and forcibly to

¹ Recently the author saw a photograph of an exhibit prepared by one of the medical associations. The exhibit consisted of (1) the advertisement of a certain product as a reliable cure of diabetes, (2) a sheaf of testimonials from individuals saying that this product had cured them, and (3) a sheaf of death certificates of these same individuals showing that they died of diabetes. The product is advertised and sold to many people. No one at present has authority to stop its sale. Truly the world of assertion and the world of fact often part company.

several cities knowledge of the schools' needs and have been an important factor in improving buildings and grounds.

Malnutrition. Various investigations and estimates have been made from time to time of the number and proportion of undernourished children in many cities and sections of various European countries and of the United States. An early study ² of 10,000 children in one of the poorer districts of Chicago showed 16 per cent of the kindergarten children undernourished. The proportion decreased to 6 per cent above the fourth grade. In Boston approximately 6 per cent were found to be undernourished. Hunter estimated in 1904 that 3,300,000 children in the United States were undernourished. More recently (1930) the estimates ³ indicate that 6,000,000 children in the United States, under nineteen years of age, are improperly nourished. In Stuttgart, Germany, careful investigation by Gaspar ⁴ of 8037 children, ages 6 to 14 years, indicated that 25 per cent were undernourished. Available evidence indicates less malnutrition among rural school children than among city school children, but the difference is not great. Draft data, however, indicate that 1.41 times as much malnutrition existed among rural adult recruits as among those from urban districts. Terman and Almack ⁵ conclude that 10 to 15 per cent of the school children in the cities of western Europe and America suffer from malnutrition. Apparently the proportion is larger among younger children and decreases as they get older. Inadequate amount of food, wrong selection of food, unbalanced diet, and difficulties or defects in assimilative processes, are the common causes of malnutrition. Many children go hungry. Many school children come to school with no breakfast or with very inadequate ones. "Of 12,800 children in 16 New York schools who were questioned privately by the principals, 7.7 per cent had no breakfast, and 15.3 per cent more

² By Macmillan and Bodine, described in Terman and Almack, *The Hygiene of the School Child*, chap. 6.

³ See White House Conference on Child Health and Protection, *Addresses and Abstracts of Committee Reports*, p. 8.

⁴ See Terman and Almack, *op. cit.*, chap. 7.

⁵ *Op. cit.*, p. 101.

only bread with coffee, tea, beer, etc.”⁶ The ill-effects of malnutrition upon children are noteworthy, especially upon growth, resistance to disease, amount of energy, as well as general health, well-being, and happiness. Malnutrition is the common antecedent of tuberculosis. Accordingly, the nutritional status of children is of fundamental importance.

Sickness. The large amount of preventable sickness among children under six years of age and among those of school age indicates the need for better care. That certain diseases are much less prevalent than a few years ago is largely the result of five factors — improved milk and water supply, better diet, the use of serums which immunize against certain communicable diseases, improved living conditions, and better medical care which prevents illness as well as treats it in the beginning stages.

Mortality. Each year sixty children of each thousand under one year of age die; five out of each thousand between the ages of one and four years; two per thousand of ages five to nine years; and one and a half per thousand between the ages of ten and fourteen (see Figs. 138, 139). After fifteen years of age the proportion of deaths increases steadily until age fifty-five, after which it increases very rapidly. We can state this more concretely. Of a thousand babies born in the United States at the present time approximately sixty will not live until they are one year old. While this rate of infant mortality is high, a very marked improvement has taken place in the last thirty years, as Figure 138 shows. For 1901-05 the rate averaged one hundred thirty-eight per thousand; that is, one baby in every eight died before celebrating its first birthday anniversary. In 1931, however, the rate was less than half the 1901-05 rate, and only one in sixteen died before the end of the first year.

Physical Defects. Bad teeth, adenoids, diseased tonsils, defective hearing, and defective vision are very common among children. They are often neglected and interfere with the child's health and happiness in many ways. In 1930 the

⁶ Terman and Almack, *op. cit.*, p. 102.

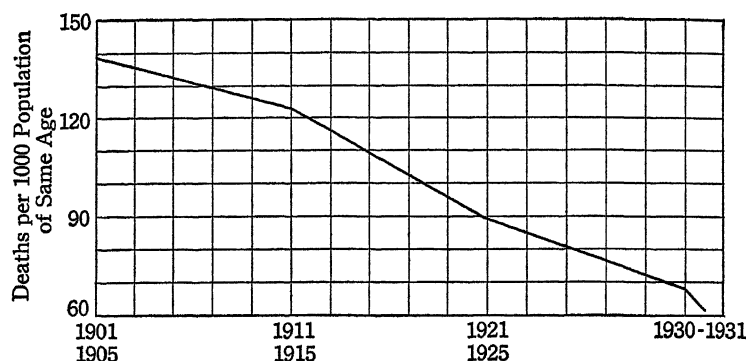


FIG. 138. INFANT MORTALITY RATES
(Children under 1 year of age) 1901-1931.

following estimates ⁷ were made on the frequency of a number of physical defects among the 45,000,000 children in the United States who were eighteen years of age and younger:

Defective speech	1,000,000
Weak or damaged hearts	1,000,000
Tubercular	400,000
Suspected tuberculosis	850,000
Impaired hearing	3,000,000
Totally deaf	18,000
Crippled	300,000
Partially blind	50,000
Wholly blind	14,000

Dental disorders are very common. Terman and Almack ⁸ estimate that only 25 per cent of school children are free from dental disorders of one kind or another. Examination reveals an astonishingly large amount of diseased teeth in European and American children, the proportions ranging from more than one-third to more than nine-tenths. When dental examinations are followed by proper care and treatment, most of the defects can be corrected. Every child should have appropriate dental care, removal of adenoids and diseased tonsils when advisable, proper treatment of impaired hearing and defective

⁷ White House Conference, *Addresses and Abstracts of Committee Reports*, pp. 8, 292-293.

⁸ *Op. cit.*, p. 168.

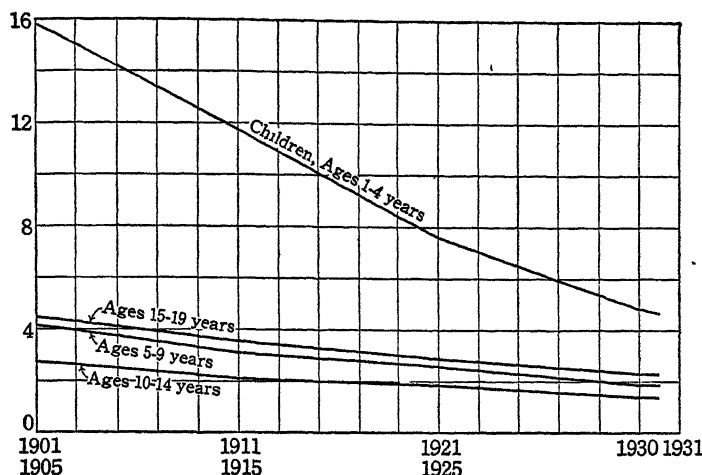


FIG. 139. MORTALITY RATES
(Ages 1 to 19) 1901-1931.

vision, as well as corrective work for any other physical defects.

Bad Mental Habits. We know that it is unwise to expect the child to outgrow diseased tonsils or defective vision, nor do we think it wise to pay no attention to various diseases. He is given appropriate medical and surgical care. In the light of recent experience it does not seem wise or expedient to expect him to outgrow bad habits of adjustment, with no help from others. The field of mental and behavior hygiene is one of increasingly recognized importance.

Improvement in Recent Years. Much has been done in the past thirty years to improve the child's physical condition and to insure his mental health. A vast amount remains to be accomplished, however, before all children will have a fundamental equality of opportunity in good health and happiness.

2. THE PHYSICAL WELFARE OF CHILDREN

Health Often Neglected by the Home. The foregoing brief survey shows that child health is not receiving the effective care it should have. Parents are the most common offenders.

The rules and standards of hygiene which concern diet and nutrition, sleep and rest, living quarters, correction of physical defects, prevention of disease, and the like are commonly violated, either through ignorance, indifference, or incompetence of parents, or because of poor economic status which prevents parents from doing what they otherwise would do for their children. Many children under ten years of age sleep not more than eight hours a day because the parents either allow them to stay up or else keep them up until ten or eleven o'clock or later, even though the youngsters must be up at seven or seven-thirty the next morning. Often it is very inconvenient for parents to see that their young children observe regular and proper hours for retiring. Many children do not have the quiet necessary for sound sleep because of crowded conditions in the home. Ambitious parents sometimes are restless and provide too many stimulating activities for their children, dragging them about to so many things that the youngsters are overstimulated and in a state of feverish excitement. Children need ample freedom to play, to be with other children, to rest, to relax, and to be natural. They should manage their own activities, but under supervision which insures good general conditions. They should be free from the painstaking, meticulous care of "Meddlesome Matties" who lay out every detail of every activity and constantly urge them in everything they do. The haste, intensity, and strain upon children from such care are not conducive to their physical or mental welfare.

Factors Affecting the Child's Physical Welfare. Almost everything with which the child comes in contact may have some influence upon his health. We may group the more important influences into seven divisions or classes, as follows: (1) diet and nutrition, (2) sleep and rest, (3) play and other recreational activities, (4) sex hygiene, (5) living quarters, (6) correction of physical defects, and (7) prevention and treatment of disease. Upon these topics many volumes have been written. We can give them only the briefest treatment and cite a few standard works in the selected references, from which more detailed information may be secured.

Diet and Nutrition. The enormous amount of experimental and clinical work on nutrition shows that, with the number of calories constant, variations in the constituent elements of diet bring about profound changes in physical conditions. It also shows that the same foods do not always have the same constituent elements. Changes in the soil alter the nutritive values of crops. Variations in the iodine, calcium, nitrogen, acidity, phosphorus, and potassium in the soil are reflected in variations in the plants. The vitamin content of milk is not constant. It is modified by the quality of the fodder fed to cattle.⁹ The two chief purposes of food are to sustain the chemical structure of the body and to supply it with energy. Dietary problems are concerned primarily with these two functions. Accordingly, diet is considered in terms of the number of calories needed per day and in terms of its division into protein, fat, carbohydrate, water, minerals, vitamins, etc. Foods suitable for the adult's diet are also suitable for that of the child; but, since the child is growing, he needs relatively more food which is rich in the materials suitable for the construction and maintenance of tissues. Since he expends energy more rapidly than the adult does, the child requires food yielding relatively more potential energy. The total daily food needs increase from infancy throughout childhood, reaching the maximum at fourteen or fifteen for girls and sixteen or later for boys ¹⁰ (see Fig. 140). The amounts needed from month to month during the first year are shown in Figure 141. Children who are very active require amounts in excess of those shown in Figure 140. The specific articles of food recommended to give suitable diets for growing children are set forth in detail in standard works on the subject.¹¹ Nutrition is fundamental to

⁹ See, for example, White House Conference, *Addresses and Abstracts of Committee Reports*, p. 61.

¹⁰ Cf. *Growth and Development of the Child*, Part 3, *Nutrition*. White House Conference on Child Health and Protection

¹¹ See, for example, the following: Bartlett, *Infants and Children: Their Feeding and Growth*, Emerson, *Nutrition and Growth in Children*; Goodspeed and Johnson, *Care and Training of Children*; Holt, *The Care and Feeding of Infants*; Holt, *Food, Health, and Growth*; Morse, Wyman, and Hill, *The Infant and Young Child*; Rose, *Feeding the Family*; and other similar volumes.

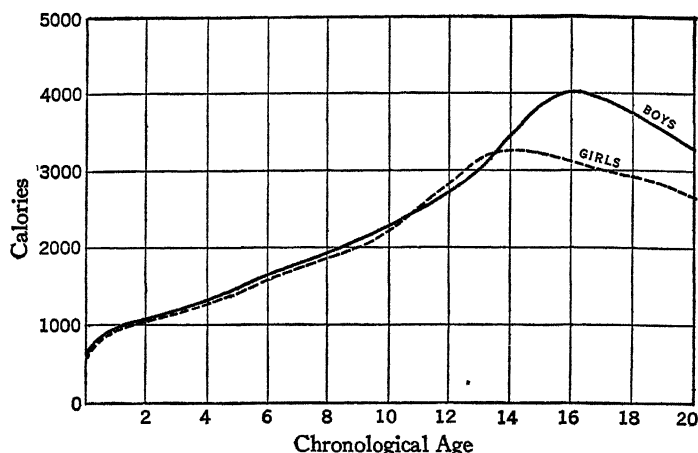


FIG. 140. TOTAL CALORIES NEEDED DAILY AT EACH AGE FROM BIRTH TO TWENTY
(After Holt.)

health and growth. A well-balanced program of child hygiene gives a large place to the proper nutrition of the growing child.

Sleep and Rest. How much sleep should the child have each day? What are favorable and hygienic conditions for the child's sleeping? Under the conditions of modern life children are surrounded by so many things they are eager to do or enjoy that parents have difficulty in insuring regular and ample sleep. Some of the best musical programs are broadcast at

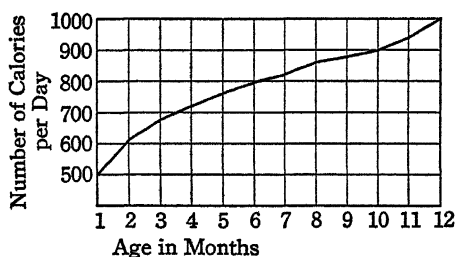


FIG. 141. DAILY CALORIE REQUIREMENTS OF INFANTS, AGES ONE TO TWELVE MONTHS

(From *Growth and Development of the Child*, Part III, p. 392.)

hours when children twelve years of age or younger should be in bed. Occasionally a children's program is broadcast at nine or nine-thirty. At this time eight- and nine-year-olds should be asleep. Then, too, the parents' own plans and activities conflict with the child's best interests and he is neglected.

Authorities ¹² differ in their recommendations of the amounts of sleep needed at various ages during childhood. In Table 19 are shown (a) the average of estimated needs at each age from six to fourteen, (b) the actual average amounts of children's sleep found by American, English, and German investigators, together with (c) the percentage of (American) children who slept until awakened. Not only do children actually sleep less than the amounts recommended by various authorities, but from one-fifth to one-fourth of them are still sleeping when awakened. This means an accumulated loss of sleep to children during the growing period. It also means that nearly a fourth of the children were not through sleeping when the parents required them to get up. Terman and Hocking's ¹³ figures also show that by the age of eighteen, nearly fifty per

TABLE 19. ESTIMATED SLEEP NEEDS (IN HOURS) OF CHILDREN AGES SIX TO FOURTEEN (AVERAGES OF ESTIMATES BY DUKE, BERNHARD, HERTEL, CLAPARÈDE, MANACEINE, KROLICH, CAVANAGH, BROWN, PFANDER, AND KEY), THE ACTUAL HOURS OF SLEEP OF 2692 AMERICAN SCHOOL CHILDREN, 6180 ENGLISH CHILDREN, 6551 GERMAN CHILDREN, AND THE PERCENTAGE OF AMERICAN SCHOOL CHILDREN WHO SLEPT UNTIL AWAKENED

(Terman and Almack)

AGE	6	7	8	9	10	11	12	13	14
Estimated need, hours . .	11 8	11 4	11 2	11 1	10 5	10 2	9 8	9 6	9 2
Actual average amount									
American children, hours	11 1	10 4	10 4	10 1	9 6	10 0	9 4	9 3	9 1
English boys, hours . .	10 5	10 5	9 5	9 3	9 3	8 8	8 3	8 5	
English girls, hours . .	10 8	10 5	10 3	9 5	9 5	9 3	8 0	7 5	
German children, hours	10 3	9 8	9 4	9 3	9 2	8 9	8 4	7 8	
Per cent of children sleeping until awakened .	21 2	19 0	23 3	19 1	22 8	20 3	23 6	24 7	26 0

¹² See Terman and Almack, *op. cit.*, chap. 19.

¹³ *Journal of Educational Psychology*, vol. 4, pp. 138-147.

cent of the children studied were not through sleeping when getting-up time came.

Wood ²⁴ recommends that children six to eight years of age have twelve hours of sleep daily (from 7 P.M. to 7 A.M.); ages eight to ten, eleven and one-half hours; ages ten to twelve, eleven hours; ages twelve to fourteen, ten and one-half hours (from 8.30 P.M. to 7 A.M.); ages fourteen to sixteen, ten hours (from 9 P.M. to 7 A.M.); ages sixteen to eighteen, nine and one-half hours (from 9.30 P.M. to 7 A.M.).

Quiet sleeping quarters with adequate fresh air are desirable. Parents have the sole responsibility for safeguarding their children's health through seeing that they have adequate hours of sleep. Communities have the responsibility of seeing that undue noise, smoke, and harmful odors are eliminated from the residential sections of cities and towns. Inadequate sleep and rest and a poor diet do not fit the child for healthy happy living. They put the school child at a serious disadvantage. When these factors are neglected to a harmful degree one need not be surprised at the child's having difficulty in meeting the school's requirements. Teachers often observe many tired and sleepy children coming to their classrooms at the beginning of the morning session.

Play and Other Recreational Activities. Play and other recreational activities are essential to the child's health and happiness. Play activities are of many diverse forms but may be divided into a few classes, such as physical (active games and sports), mental (chess, card games, checkers, puzzles), rhythmic (music, dancing), and creative (art, craftsmanship). Obviously, a given activity may combine two or more of these forms. Children love to play, and they need opportunities to do so. Through group play children learn to work together in attaining group purposes and thus form habits of cooperating with others. Games provide valuable physical activity and recreation, which are better secured in this way than through the formal "exercises" which constituted the physical culture programs once popular. The well-balanced program of phy-

²⁴ See Williams, *Healthful Living*, p. 326.

sical education at school includes a wide variety of activities, games, calisthenics, special corrective exercises, and the like. Too often the physical education work in schools has been handicapped by meager facilities, excessively large classes, and poorly trained teachers, with the consequent lack of a well-balanced program. The games and other activities suitable for the various ages are described in many volumes on the subject.¹⁵

Sex Hygiene. The sex life of the child begins at birth. Parents have the responsibility of giving the child instruction suited to his age and needs, as well as giving him training in proper habits. The needed information should be given gradually, in proportion to the child's curiosity and capacity for understanding it. The information given a child of five or six will be different from that given a child of twelve, both in form and in certain features of content, but the one should be in harmony with the other. Falsehood, "fairy tales," and emotional stress should have no place in giving a child instruction on sex matters. The child should feel perfectly free to ask his parents for information and he should feel confident that they will tell him the truth. The young child's inquiries on sex matters are from curiosity; that is, they are for information. They are not emotionally toned. They are just as natural as his curiosity about what makes a clock strike, or what makes an automobile go. They should be treated with similar candor. Unless the child receives this instruction from his parents he will secure it from other less desirable sources, in ways which may build up a wrong attitude toward sex and ill-prepare him for puberty.

Sex instruction has a place in the school but not in a special course. In the case of children in the nursery school and the elementary school not so many opportunities for instruction in sex hygiene are open to the teacher as are found in high school

¹⁵ See, for example, Bancroft, *Games for the Playground, Home, School, and Gymnasium*; Curtis, *Education through Play*; Foster, *Busy Childhood*; Lippitt, *A Manual of Corrective Gymnastics*; Rogers, *The Child and Play*; Van Alstyne, *Play Behavior and Choice of Play Materials of Pre-School Children*.

with sex segregation in physical education, hygiene, biology, and household arts. Suggestions for parents and teachers are given in many excellent volumes.¹⁶

Hygienic Living Conditions. We have already discussed the need for proper housing for the family and the school. Heating, lighting, ventilation, safety and convenience, sleeping quarters, seating, play facilities, and the like have to be considered. These topics are discussed in detail in textbooks on school hygiene¹⁷ and home planning.¹⁸

Correction of Physical Defects and the Prevention and Treatment of Disease. A sound program of child hygiene includes corrective work to relieve the child of any physical defects, such as bad teeth, adenoids, diseased tonsils, or impaired hearing and vision. It also includes immunization against preventable diseases, and the prompt treatment of sickness, so that medical care may reduce its ravages to the minimum. The home, the school, and the community share the responsibility for safeguarding the child's health in these ways.

In conserving child health the work of home, school, and community supplement each other. The closest cooperation is needed so that there shall be no waste, neglect, or needless overlapping. In general the work of the home concerns such matters as diet, sleep, clothing, posture, outdoor and indoor play, and other recreational activities, especially before the child enters school and during out-of-school hours after he enters school. The home also has responsibility for the formation of health habits, provision for dental and medical examinations and care, especially during the first six years, including any

¹⁶ See, for example, the following: Armstrong, *Sex in Life*; Bigelow, *Sex Education*; Brown, *Child Questions, and Their Answers*; Cady, *The Way Life Begins*; Chapman, *How Shall I Tell My Child*; Committee Report on the Teacher's Part in Social Hygiene; Galloway, *The Biology of Sex for Parents and Teachers*; Galloway, *The Father and His Boy*; Hood, *For Girls and the Mother of Girls*, McLaughlin and Tobey, *Personal Hygiene*; Torrelle, *Plant and Animal Children, How They Grow*.

¹⁷ See, for example, the following: Averill, *Educational Hygiene*; Ayres, Williams, and Wood, *Healthful Schools*; Dressler, *School Hygiene*; Strayer and Engelhardt, *Standards for Elementary School Buildings*.

¹⁸ On housing, furnishing, management, etc., of the home, see *The Home and the Child*, a committee report of the White House Conference on Child Health and Protection.

needed corrective work, and immunization against communicable diseases. The home's responsibility along all of these lines is especially noteworthy during the first six years of the child's life.

The work of the school for child health and happiness includes adequate provision for effective health instruction of children, suitable programs of play and other recreational activities, provision for the safety, cleanliness, attractiveness, heating, lighting, ventilation, and seating of buildings. Many schools also provide lunches — especially for the undernourished — arrange medical and dental examinations and care with corrective work either through the home or through school clinics, and cooperate with the home and community in immunization against communicable diseases. More distinctively educational approaches to hygiene include the arrangement of scholastic demands to meet pupil abilities and needs and to relieve them from unwise mental and emotional strain, the organization of special classes for children having certain deficiencies and defects, and the provision of conditions which make school life generally happy and exhilarating.

The community has the responsibility for insuring a pure milk and water supply, food inspection, enforcement of suitable health regulations, including prevention of air contamination by smoke or fumes, provision for parks and playgrounds which are readily accessible to the children, and support of school building and repair programs which will give children hygienic living conditions while at school.

How well are the home, the school, and the community discharging their obligations for child health? We have already noted the extent of malnutrition and various physical defects (pp. 480-482). Since it is highly desirable that preventive measures be taken early in childhood, let us see how well the health of the pre-school child is guarded.

Recent studies¹⁹ of nearly two hundred thousand pre-school children from urban and rural districts have brought out sig-

¹⁹ See *Health Protection for the Pre-School Child*, White House Conference Reports, Part 2

nificant facts. Four kinds of preventive measures are considered: health examinations, immunization against diphtheria, vaccination against smallpox, and dental health examinations. Approximately half the urban children under six years of age received health examinations; and approximately three-eighths of the rural children. Twenty-one per cent of urban and 18 per cent of rural pre-school children had been immunized against diphtheria; 21 per cent and 7 per cent, respectively, had been vaccinated against smallpox; and 13 per cent of each group had dental health examinations (see Fig. 142). From these facts it appears that the rural child is more neglected than the city child, but the differences are not nearly as great as one might suppose. Of the children under six years of age, one city child in five is protected against smallpox; one country child in fourteen. In diphtheria immunization and dental health examinations, it is remarkable that the rural child has the same protection as the city child. While remarkable prog-

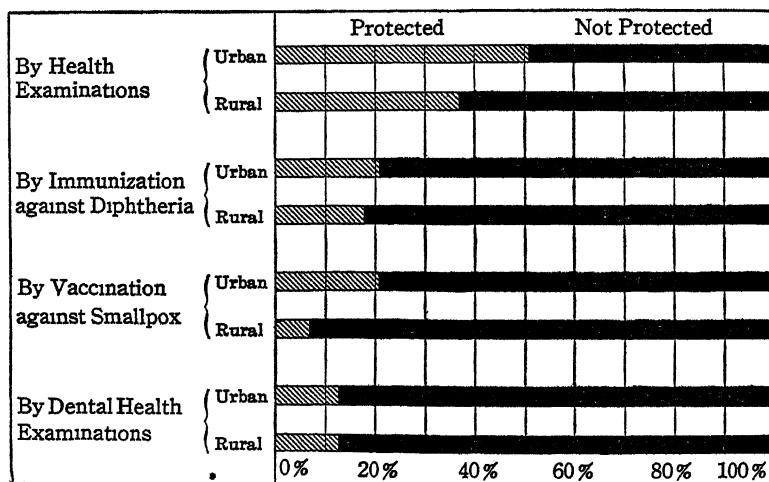


FIG. 142. PERCENTAGE OF URBAN AND RURAL CHILDREN UNDER SIX YEARS OF AGE WHO HAD HEALTH EXAMINATIONS, IMMUNIZATION AGAINST DIPHTHERIA, VACCINATION AGAINST SMALLPOX, AND DENTAL HEALTH EXAMINATIONS

(From *Health Protection for the Pre-School Child*)

ress has been made in giving young children health protection, the work yet to be done is enormous.

Another committee²⁰ studied home conditions of 3520 children. Its summary about the average four-year-old child shows that he is not likely to be weighed at regular intervals; that he sleeps eleven and one-half hours daily, in a bed of his own but in a room with some other person; that he drinks from one and one-half to two and one-half pints of milk each day; that his diet is fairly adequate, but not up to highest standard, being affected by economic status of the home; that the chances are even that he has cod liver oil in winter; that meals are at regular hours but with some eating between meals; that his undergarments are changed twice a week, his suits or dresses daily; that he has a daily bath in summer and two a week in winter; that bladder and bowel control during the day and night have been established; that he has a toothbrush and uses it; that he does not dress himself completely; that he is not likely to suck his thumb or stutter; that he has had at least one medical examination; and that he is troubled very little with colds and coughs. The report also shows that the chances are:

- 1 out of 3 that he has been inoculated for diphtheria.
- 1 out of 4 that he has been vaccinated for smallpox.
- 2 out of 5 that he has had whooping-cough.
- 1 out of 3 that he has had measles.
- 1 out of 3 that he has had chicken-pox.
- 1 out of 10 that he has had mumps.
- 1 out of 20 that he has had scarlet fever.
- 1 out of 40 that he has had pneumonia.

We quote from the report:²¹

The chances are exceedingly slight that he is not punished, and there is somewhat more probability of punishment by the mother than by the father. He probably gets one to four spankings a month. In controlling him, the parents, in addition to occasional spankings, scold or reason with him, rather than compare him

²⁰ White House Conference on Child Health and Protection, *Addresses and Abstracts of Committee Reports*, pp 156-159.

²¹ *Op cit.*, pp 158-159. Quoted by special arrangement with the publishers, D. Appleton-Century Co., New York.

unfavorably with another child, or put him to bed, or in a corner. The chances are about even that the child has a definite fear. If he has, the parents attempt to explain the situation to the child, rather than to soothe or divert him. He is likely neither to have a favorite in the household, nor to show jealousy. The chances are even that he has a favorite story or book. It is his mother rather than his father who reads to him or tells stories. He can count a little, knows rhymes, songs, and prayers, but has not learned the alphabet. He has shown little curiosity about the origin of babies. He tends to be restricted to his home yard in his play and probably plays with other children both at home and elsewhere. Usually he plays outdoors from five to eight hours during the day, either in his own or neighbors' yards. The chances are even that he has attended the movies, going once or twice a month.

This picture of the four-year-old shows better home conditions than one would expect.

*An Ideal Program for the Physical Welfare of Children.*²²

An ideal program for the physical welfare of children may be stated as follows:

1. For every child health protection from birth through adolescence, including: periodical health examinations and, where needed, care of specialists and hospital treatment; regular dental examinations and care of the teeth; protective and preventive measures against communicable diseases; the insuring of pure food, pure milk, and pure water.
2. For every child from birth through adolescence, promotion of health, including health instruction and a health program, wholesome physical and mental recreation, with teachers and leaders adequately trained.
3. For every child a dwelling-place safe, sanitary, and wholesome, with reasonable provisions for privacy; free from conditions which tend to thwart his development; and a home environment harmonious and enriching.
4. For every child a school which is safe from hazards, sanitary, properly equipped, lighted, and ventilated. For younger children nursery schools and kindergartens to supplement home care.
5. For every child a community which recognizes and plans

²² Articles 5-9 of the *Children's Charter* formulated by the men and women participating in the White House Conference on Child Health and Protection.

for his needs, protects him against physical dangers, moral hazards, and disease; provides him with safe and wholesome places for play and recreation; and makes provision for his cultural and social needs.

3. THE MENTAL HYGIENE OF CHILDHOOD

The purpose of hygiene is health. The purpose of mental hygiene is mental health. What, then, is meant by mental health, or when is a child mentally healthy? Of what importance is mental health during childhood? What are the essentials of a desirable program of mental hygiene? What place does preventive hygiene have in such a program? What things should the home do? The school? The church? The community?

☞ *The Meaning of Mental Health.* A person is in mental health if he can attain and maintain satisfying and satisfactory human relationships.²³ He is mentally healthy if he adjusts himself so as to avoid undue conflicts, stresses, and strains, and if he adjusts himself to the world of people, things, and events about him so as to be highly effective both socially and personally, and at the same time to find much satisfaction in life. He achieves the most his abilities allow, secures for himself and society the greatest amount of satisfaction, but with the least strain and friction. As we saw in Chapter XVI, desirable and undesirable patterns of response shade from one to the other by minute steps rather than being the two categories in a dichotomous division. Individuals vary in the amounts of mental health just as they do also in the amounts of physical health.

The Aims of Mental Hygiene. Preventive mental hygiene may be said to have two aims, which are, however, closely related. The first aim, which may be achieved directly, is to prevent the minor maladjustments of life which cause the individual to be less happy and effective. These common social and individual difficulties are the ones described in the preceding chapter. There is no doubt at the present time that the

²³ See Williams, in *Mental Hygiene*, vol. 11, pp. 482-489.

less serious mental disabilities such as these can be prevented by the application of sound mental hygiene principles.

The second aim of mental hygiene is to prevent the more serious mental disorders which are termed insanities or psychoses. The problem of mental disorder is an urgent one. Approximately a half million persons in the United States, or about one in every two hundred fifty, are confined in mental hospitals. About \$75,000,000 are spent annually for the care of these persons, and approximately \$250,000,000 are invested in buildings and equipment of mental hospitals. In addition, there is the enormous economic loss of the time of the patients, as well as the unhappiness which is their lot and that of their families.

The serious mental disorders are usually divided into two groups. About one-half of the cases are due to organic causes, such as syphilis and other bacterial diseases, alcoholism, brain tumors, or the hardening of the arteries of the brain. Some of these causes may be prevented by physical hygiene, but mental hygiene is less intimately concerned. The other half of the cases consist of the psychogenic or functional psychoses. Many authorities believe that these persons are mentally disordered because of excessively bad habits of personality adjustment, severe mental conflicts, and the like. If this is true, then correct conditions of living and other desirable psychological precautions should prevent many of these cases.

It is difficult to evaluate the merit of the ordinary procedures of mental hygiene in the prevention of the functional psychoses. The belief that good habits of adjustment may prevent these disorders is based chiefly on the fact that they do not appear suddenly, but show a long history of development beginning in childhood. No person becomes seriously mentally ill who does not first suffer from a lesser maladjustment of long standing. The mental patients of today are drawn from the ranks of the queer, seclusive, suspicious, or maladjusted children of yesterday.²⁴ Presumably, any effective measures taken against minor

²⁴ The converse of this statement, of course, is not true. Most maladjusted children recover, or, at the worst, become no more than maladjusted adults. Only a few of them develop more serious disorders.

maladjustments will serve in some degree to lessen the occurrence of the functional psychoses.²⁵

The Essentials of a Mental Hygiene Program for Children. The essentials of a mental hygiene program for children may be stated very briefly and simply. In addition to provisions for physical health, they are (1) play and other recreational activities, especially with other children of the child's age; (2) with increasing age, some contact with a variety of wholesome and useful activities, but largely at the play level; (3) home and school environment free from worry and emotional tensions and upheavals, with suitable guidance and control; (4) useful habits and skills; (5) freedom and responsibility; (6) self-confidence and self-control; (7) an alertness to the child's patterns of response which insures immediate attention to adaptive difficulties; (8) appropriate psychological and psychiatric care as needed.

(1) *Play and other recreational activities.* The child revels in play. He should have ample opportunities to engage in many play activities, especially with other children, in order that he may learn to get along with them. When engaged in group play he has no time to be moody. He learns a great deal of the give and take of life. If his play is properly supervised, he will learn to be less selfish and will center his attention more outside of himself. The activities of play, if properly handled, keep his attention upon the present. He cannot substitute daydreaming for overt activity, because the other children have a way of showing their displeasure that stimulates him to play his part in the group activities.

(2) *A variety of wholesome, useful, and interesting activities, largely at the play level.* As the child grows older, he should increasingly engage in wholesome useful activities which have high educative value. This is particularly true when he reaches school age and enters upon school activities. And yet these are best approached through a maximum of interest. The child

²⁵ For more extended discussion of serious mental disorders see Brooks, *Psychology of Adolescence*, pp 477-492, Rosanoff, *Manual of Psychiatry*, and various textbooks on abnormal psychology.

has intellectual curiosity. He likes to learn and likes to acquire skill. These factors can be utilized so that school activities will have little stress and strain, and yet he will be experiencing those things which truly educate.

(3) *Home and school environment free from worry, strain, and emotional upheavals.* One of the most important elements in an effective program of mental hygiene during childhood is favorable home and school environment. The child should be reasonably free from the stress and strain of family wrangling. His life at home and at school should be happy. He should receive sympathetic, firm, even, just, and rational treatment at the hands of the adults who guide and control his behavior.

Although it is difficult to trace adaptive difficulties to their original causes, yet much clinical work indicates that a great many ineffective adjustments date back to some bad home condition. A boy eight years of age, Stanford-Binet I.Q. 112, in excellent health and well-developed physically, was in the high third grade in a city public school. His scholastic work was very good. His difficulties lay in other directions. He pouted, cried easily, was very egotistical, was greatly dependent upon his parents, and was very unpopular with other children. He was the only child. The mother was very nervous and erratic, the father highly excitable. Neither of them had any patience with the boy and whipped him for the slightest offenses. He had no opportunity to do anything he wanted to do. He had no chance to play with other children. After school he was taken to his father's store. He did not know how to play and did not want to do so. He usually preferred to stand against the wall at recess. The boys called him a "sissy" because he cried so easily, and they did not want to play with him. When he entered first grade he was very shy and felt inferior to the other children. His good mind enabled him to do good scholastic work, and he began to be egotistical and very patronizing toward other children, probably as a compensatory adjustment because of his inferiority in play. The father not only brought the boy to school, but brought him to his room, helped put away books and coat, and stood beside him until school began.

The mother called for him at lunch time, brought him back in the afternoon, and called for him at the close of the afternoon session. The teacher suggested that the boy be given a chance to do things for himself and develop independence and self-respect before it was too late. The parents refused to modify their treatment of the boy, and the situation became worse. He was exceedingly unhappy, highly sensitive, overbearing in his egotism, and readily resorted to tears. Fortunately for him, the boys nicknamed him "Marie," much to his humiliation and his father's indignation. Again it was pointed out that the nickname was the logical outcome of their treatment; that no other boy in his room was brought to school by his parents and treated as if he were a baby. The teacher explained to the boy that he would have to prove to the other boys that he was not a sissy and did not deserve the nickname. Finally, one day the most abusive boy in the class called him "Marie," when he was in a bad humor. At recess a fight ensued in which "Marie" won. This was the beginning of his overcoming the handicaps his parents had placed about him. Other boys began to respect him, and his nickname was dropped. The teacher tried to make many opportunities for him to learn to take his place in the world of other children. She asked the boys to teach him to play games. In afternoons he went on walks with the boys. He was allowed to invite friends to the house and to visit them in their homes. He took charge of group assignments in socialized lessons and assisted in guiding the boys' line in the school yard. Within six months, a marked change had taken place. The children began to like and respect him, his attitude toward the class was completely changed, and the parents did not bring him to school or call for him. Now he goes down town (in a large city) on the street car alone and plays a great deal with other boys among whom he has many friends. Six weeks in a boys' summer camp brought still further improvement in his becoming a normal, happy, social being.

(4) *Useful habits and skills.* The possession of many habits and skills enables the child to meet more readily the demands

made upon him by life in school, at home, and on the playground. Useful knowledge assists him in developing independence and self-confidence because of his greater effectiveness in meeting these demands.

(5) *Freedom and responsibility.* The child needs all the freedom he can use without harm to himself and others. Normally the child wants to do things on his own initiative and he should have opportunity to do so. Freedom does not mean absence of control. It means that the child has the chance to do some things on his own initiative and that he is held responsible for his acts. The amount of freedom needs to be graduated to the child's capacity to use it. If parents are too dominating and from earliest infancy do everything for the child, he may be so dependent he will not know how to do things for himself.

(6) *Self-confidence and self-control.* Particular attention needs to be given in mental hygiene to the child's developing self-confidence and self-control. This problem already has been discussed in Chapter XV. Without these qualities the individual cannot attain that success which his abilities permit nor the satisfaction he craves and needs. Friction and strain are more likely to be found when self-confidence and self-control are lacking.

(7-8) *Alertness to adaptive difficulties and appropriate treatment of incipient or other behavior aberrations* are also essential to an effective mental hygiene program for children. Through them appraisals and analyses will be made constantly to be sure the child's development is proceeding as it should, and then appropriate remedial measures will be taken as needed.

Mental Hygiene in the Home. The experience of mental hygienists indicates that many of the child's adaptive difficulties are caused by bad home conditions. Parents who are unsympathetic, who always nag the child and are constantly complaining exert an unwholesome influence on him. Those who treat him harshly or unjustly, or undervalue his personality, or unnecessarily expose his real faults, are not helping him make effective and satisfying adjustments, but are subjecting

him to undue frustrations and conflict. His compensatory adjustments to these stimuli may be unfortunate and undesirable. Weak and over-indulgent parents often coddle the child, give him his own way in everything, free him from all responsibility, try to anticipate his every wish and to smooth out all difficulties for him, and thus habituate him in not doing things for himself or for others. Naturally he does not get along as his parents wish, and the unsatisfactoriness and ineffectiveness of his adjustments become even more apparent and serious as he passes from childhood to adolescence and adulthood when normally he should be independent, self-reliant, responsible, cooperative, and much less self-centered. On the other hand, domineering parents may develop timidity and shyness in their children so that they are dependent and lack self-confidence.

Proper home conditions allow the child ample freedom but with responsibility and guidance adequate to his needs. They also provide opportunities for him to engage in a wide variety of wholesome activities under circumstances which develop his initiative, independence, self-confidence, and ability to get along with other children his own age. Broken homes and homes in which there is much wrangling, especially between parents, have an unwholesome effect upon the child. Life in many homes is turbulent, exciting, and full of emotional upsets. The child does not have an opportunity for calm natural living, free from the unwholesome influence of adults' ineffective emotional attitudes. The child is likely to develop fear and anxiety or to be constantly apprehensive. Sometimes parents forget their own childhood and how real and vital its problems were. They treat the child and his problems with ridicule, condescension, or contempt. The thing the child is doing may seem of no importance and the parent may disparage it; whereas it is of considerable importance to the child. Under these circumstances harm may be done the child, and the parents may lose sympathetic contact with him. Parents' intentions may be good enough, but their influence upon the child's mental health may be bad. The most difficult problems of mental hygiene in the home often are the result of the bad

emotional adjustments of the parents themselves. Such conditions make very difficult indeed the work of other agencies which endeavor to improve the mental hygiene of the child.

A Case of Good Home Conditions. The literature on mental hygiene bristles with accounts of bad home conditions and of case studies in which the parents exerted a harmful effect upon the child's mental health. After reading a great many of them, one sometimes may wonder whether there are any effective homes and whether parents universally have fallen down on the job of being parents. Of course, mental hygienists have more contacts with children whose personalities are warped and twisted, and since the home usually exerts the most powerful influence on the child's mental health, they have a wealth of information about bad homes and harmful, inefficient parents. However, there are vast numbers of good homes and competent parents.

Robert C., now eleven years old, is a very bright capable boy. He is full of energy and has always been active and vigorous. Both his father and mother have considerable force of character and are much above the average in intelligence, personal integrity, initiative, leadership, and cooperativeness. Both are college graduates. The father is very successful in business and is well-liked by his associates who know how honest and dependable he is. Both parents have a keen sense of humor and enjoy life greatly. They bear their share of responsibility in various social, charitable, civic, and church undertakings in the city in which they live. Each seems to be ideally adjusted to life and its problems as well as to his or her own personal problems. From the foregoing account one can easily fill in the description of their control of Robert. It has been rational. As a little fellow, he has always known the reasons for many of the things which he should or should not do. He has had his own room, his own possessions, and has had adequate time to do things on his own account. Like any other child, he has made many mistakes. When he has failed in some attempt, his father often has said in a friendly manner, "Well, son, it didn't go so well that time, did it? What's the

matter, can't you do it? Better watch your step next time," or other similar remarks. If the boy tried to do a task a little too hard for him, the father might ask, "Want some help? That's pretty hard for a fellow your size." He has had bumps, cuts, bruises, scratches, and the thousand and one other mishaps a normal healthy boy should have. He has learned self-reliance, self-control, and persistence, is free from unusual emotional quirks, and is happy. What the father has said to his boy, and what he has done, are of much less significance than the spirit in which he has spoken and acted. He shows a love for the boy as strong as anyone could wish for, but he has recognized that the youngster has his own life to live. This wise father knows that the boy must learn to live according to his own standards and that the father's business is to help and guide him, but to keep out of the lad's way and give him a chance. Nor could one question the parents' moral and social standards. They want their son to achieve the same high standards of conduct, but they believe that the best way to accomplish this result is by exemplifying these principles and standards in their own living. Problems of conduct are discussed with the boy from time to time, but in concrete fashion, and his opinions are allowed to enter into the discussion. The boy does not serve as an emotional outlet for his parents. Instead, they guide him thoughtfully for his own ultimate good, rather than to fit their own moods or convenience.

Mental Hygiene in the Nursery School and Kindergarten. Fortunate indeed is the child who can be in a good nursery school or kindergarten for two or three years. These schools usually do much for the child's mental health. The nursery school program embraces many essentials of mental hygiene. Play and constructive activities under direction and supervision leave to each child much freedom for initiative, yet assist him to learn to be happy in group activities. Thus, he develops desirable social traits, eliminates some egocentrism, and lays a solid foundation for wholesome child life. Care for the physical welfare of the child tends to relieve him of the strains incident to poor physical condition. The alertness of trained

teachers and assistants to behavior problems results in the intelligent diagnosis and remedial treatment of behavior aberrations as they may appear from time to time. The child really learns much of effective, happy group living. He lives a life that is essentially healthy mentally for several hours a day. To do so for two or three years may be a long step toward mental health. We learn to do by doing; apparently, we learn to live by living. The open-minded, experimental attitude characteristic of many directors and teachers in nursery schools is likely to insure not only the best procedures now known in nursery schools but also improvements which their own experience from day to day may show to be practicable and of value.

Mental Hygiene in the Elementary School. The mental hygiene program of the elementary school involves not only the school work, but also the play and other recreational activities. Everything the school does, and all that pupils do in school, have significance for the child's mental health. It will be well to make an inventory of the principal features of the school program that allow it to perform its mental hygiene task successfully.

(1) *A sound educational philosophy.* The fundamental guide in setting up and evaluating all school programs and activities is the underlying educational philosophy. At the present time considerable discussion and differences of opinion on educational principles may be found. To us it seems that the school should be a place where pupils and teachers live happily and effectively together while engaged in socially and individually useful activities. Interest factors have a very important place if children are living happily together and if they are living effectively, for it seems obvious that, other things being equal, the most effective responses are found where interest is strong and vital. The critical evaluations of the content of the elementary school curriculum in recent years have been wholesome and have led to the elimination of much useless material.²⁶

²⁶ Why, for example, should pupils have to study such problems as the following in arithmetic? And yet they were found in arithmetics in use a short time ago, even

The emphasis upon happiness, interest, effective group living, and the utility of activities seems advisable from the mental hygiene point of view.

(2) *A broad program of activities.* A wide variety of activities is desirable in the elementary school, play and recreational as well as scholastic. They make possible a well-rounded program of child development by training the child in many important social skills.

(3) *Methods of work or study.* On the scholastic side, much can be said of the value of training children in effective habits of work. It is conducive to the pupils' greater achievement, tends to develop self-confidence, and helps to eliminate the conflicts attendant upon unsatisfactory work.

(4) *Alertness to adaptive difficulties.* Adaptive difficulties are found among elementary school children, and many bad adjustments are made during the years from six to twelve. Provision for their early detection and proper treatment should be made by the school through appropriate organization, administration, and teaching personnel. Teachers need to be constantly alert to discover any ineffective adjustment and to help the child overcome it. Teachers can do a great deal for the mental health of their pupils, but sometimes cases require the services of a properly trained school psychologist or psychiatrist.

(5) *Psychological or psychiatric service or clinics for behavior cases.* Preventive work is preferable to corrective work. Behavior cases from time to time require the services of a competent school psychologist or psychiatrist. In all of these cases the usual procedure is to have a thorough physical medical examination. In many cases the key to the behavior difficulty lies in some physical condition, as, for example, in the case of a boy who showed an increasing stubbornness which finally led to open insubordination. Physical medical examina-

though one may question their practicality in ascertaining a woman's height or the thickness of a board. "A nail 4 inches long is driven through a board so that it projects 1.635 inches on one side and 1.428 inches on the other. How thick is the board?" "A man 6 feet tall weighs exactly 175 pounds. How tall is his wife, who is of similar build and weighs 125 pounds?"

tion showed a very bad case of trachoma, the granulations on the inside of his eyelids becoming an increasingly irritating condition. Behavior cases should have that competent attention which insures accurate diagnosis of the difficulty and its causes and effective remedial treatment.

(6) *School requirements proportionate to pupil ability.* The child is compelled by law and by his family to go to school during the elementary school years. Much of his school time is taken up with scholastic activities upon which great emphasis is placed by both school and home. Children, however, differ enormously in their abilities to do academic or scholastic work. Accordingly, the school faces the task of adapting its requirements to the varying abilities of its pupils. If it does not do so, then some children can meet the school's demands by working only a short time or with little concentrated effort; but others, who have less ability, may work very hard indeed and yet receive poor marks or fail. The former are trained in loafing or half-hearted effort, whereas the latter have the unfortunate experience of failure crowning their best efforts, with its discouragement and feelings of inferiority. Older children, facing this undesirable situation, often have saved their self-respect by building up the attitude that school does not amount to anything, and by quitting school as soon as possible and securing a job of some kind. At the present, however, and probably for some time to come, the discouraged overaged elementary pupil cannot have much hope of securing employment because society has little for him to do at the age of thirteen or fourteen. So the problem is forced back onto the school where it belongs.

What is to be done? Law and the parents send the child to school. Is it just, expedient, or wise to set up standards which he cannot meet even with an unreasonable amount of effort, and standards which the school knows he cannot attain if it knows as much about him as it should and can readily know? Is it fair and wise then to put the opprobrium of low marks or failure upon him because he does not do what we know he cannot do? Obviously, the problem of making the school's demands

accord with the pupil's ability is just as difficult as it is important. If the child and his welfare are made the center of gravity in the school; if all administrative, supervisory, or instructional activities of board of education, superintendent, principals, and teachers are centered about him and his needs; then we may hope for suitable solutions of this problem. As long as the school sets a single standard which all pupils must reach whether they can or not, it is not doing its full duty for the mental health of its pupils. We realize that discussing this problem is much easier than finding a satisfactory solution under conditions of limited financial support, and the like. No child in the elementary school should build up feelings of inferiority and become discouraged at the very outset of life because the school fails to recognize and provide effectively for his needs.

(7) *Mastery.* Having provided activities in accord with pupil ability, the school's next responsibility is to see that every child masters some task. Each child should have the joy, satisfaction, and self-confidence that come from knowing that he has done something well. We question seriously the cultural value of hazy, incorrect, or slipshod learning of anything in the elementary school. We recognize the fact, however, that all things in the elementary school do not require the same degree of mastery. The fine art of the teacher is brought into play at just this point. The child needs to master some things. This requires concentrated and possibly prolonged effort. To be most effective, most satisfying, and therefore of most value for mental health, the child's work must be interesting. Mastery gives joy, self-confidence, and a predisposition toward achievement which are valuable for the child's mental health as well as for his general efficiency.

The Church and Mental Hygiene. What can and should the church as a religious institution do for the child's mental health? Our discussion here will be confined entirely to matters of religion, in the more restricted sense, omitting consideration of athletic and social clubs, Boy Scouts, and other similar organizations fostered as part of the church's work with its

children and young people. This is done not because of a belief that churches are unwise in including these things in their program, for on the contrary, we feel reasonably sure that the churches are wise in doing so. All of these things have their value in moral education and mental hygiene. But the church itself, as a religious institution, may make an important contribution of a unique sort to mental health. We recognize and readily acknowledge our own limitations in discussing this matter. Those expert in religion and having much experience in religious teaching and ministration are more competent to describe this topic. To them, in the various fields, the reader is referred.

We conceive of religion, not as a useless tool of the strong or the refuge of the weak, nor yet as an intellectually disreputable emotional fervor, as some seem to do. We have tried (in Chapter XIV) to show, by discussion and by reference to the literature on the subject, that true religion is an integrating force in the lives of people to whose mental balance and health it can contribute much.

The central core of religious experience is worship. Music, ritual, and other important elements of worship do, under favorable circumstances, contribute much to personal integration. Joy, praise, prayer, confession, and sublimation can have distinct values for the child's mental health. The more effective use of these means is desirable in many churches. The feeling of security which religion can give the child is noteworthy. The old saying has it that "honest confession is good for the soul." On this point the clinical experience of psychiatrists and other mental hygienists is clear and definite. Frank recognition and acknowledgment to one's self or to others of faults, of conflict of desires, are precisely what is meant by *facing reality*, an essential of mental health. Psychiatrists in many cases of mental ill-health induce the patient to tell of his trouble, and how it began. They find that such frank acknowledgment and understanding of it have distinct curative value and are important steps in effecting improvement. The formal confessional has a similar mental hygiene value in

those churches which employ this procedure. A number of clergymen in denominations that do not use the confessional have suggested the value of a similar more informal meeting between the minister and his parishioner. A sincere prayer of confession may have the same effect, in helping the individual to face his own faults honestly.

In order to promote mental health and happiness among children, their religion must be suited to their needs and to their degree of development.

Other Agencies Contributing to Mental Hygiene. Many other institutions in addition to the home, the school, and the church may contribute to mental hygiene. Work of especial value is done by organizations having a program which combines recreation with a broad type of educational service. These include the Boy Scouts, Girl Scouts, Camp Fire Girls, Y.M.C.A., Y.W.C.A., and other similar groups. Many of the aims of mental hygiene are served through these organizations more effectively than through any other agencies. They supply a variety of wholesome and useful activities, cultivate both freedom and responsibility, and give the youngster an opportunity to succeed in tasks which interest him. Often these organizations supply experiences that inadequate homes are unable to furnish.

All social activities which train the child to face reality, to be less self-centered, and to make good adjustments to others of his own age are helpful in the program of mental hygiene.

SELECTED REFERENCES

PHYSICAL HYGIENE

On the care of the child at home see Goodspeed and Johnson, *Care and Training of Children*, Parts 1 and 2. For information of value to home, school, and community see Williams, *Personal Hygiene Applied* (2nd edition), chaps. 6-14; Richardson and Hearn, *The Pre-School Child and His Posture*, chaps. 2, 4, 5, 7; Rogers, *The Child and Play*, chaps. 1, 3-8; Terman and Almack, *The Hygiene of the School Child* (revised), Parts 3 and 5; Pressey, *Psychology and the New Education*, chap. 3. On problems of nutrition, see Emerson, *Nutrition and Growth in Children*; Holt, *Food, Health, and Growth*; Rose, *Feeding the Family*. On sex education see Bigelow, *Sex Education* (revised), chap. 6.

MENTAL HYGIENE

For data on mental hygiene of children see Blanton and Blanton, *Child Guidance*, chap. 14; Blatz and Bott, *Parents and the Pre-School Child*, Part II, chap. 1; Groves and Blanchard, *Introduction to Mental Hygiene*, chaps. 5, 8; Hollingworth, *Educational Psychology*, chap. 17; Howard and Patry, *Mental Health*, chaps. 5, 9, 10, 13; Moss, chap. 22 in *Educational Psychology* (edited by Skinner); Olson, in the *Thirty-Fourth Yearbook* of National Society for the Study of Education, chap. 18; Sherman, *Mental Hygiene and Education*, chaps. 7-10, 13; Wallin, chap. 21 in *Educational Psychology* (edited by Skinner). See also White, *Mental Hygiene of Childhood*; Symonds, *Mental Hygiene of the School Child*, and the references given at the end of this volume.

CHAPTER XVIII

THE ORGANIZATION OF TRAITS

THROUGHOUT the study of the psychology of childhood quantitative studies have been cited which show the course of development of a large number of traits of children. The growth of physique, of motor skills, of language, and of mental abilities has been traced in detail. The study of each of these characteristics is important for its own sake. A further investigation may be undertaken, however, of the *relationships* between these phases of growth. In the actual child, the various qualities grow together and in interaction, not in isolation. Some traits are closely related in their development; others are more loosely associated. Only by considering the traits together can a picture of the whole child be obtained.

Unfortunately, our knowledge is limited concerning the interrelationships of one very important class of traits, the characteristics of personality. This deficiency is caused chiefly by the lack of adequate quantitative techniques in this field. Some useful information is available, however, on the personality traits of intellectually gifted children and on those of children at the average and below the average in mental ability. Also, we have some knowledge of the personality traits of delinquent children which is of value in predicting, guiding, and controlling child behavior.

I. THE ORGANIZATION OF TRAITS DURING CHILDHOOD

What are the interrelations of physical traits during childhood? Of mental traits? Of moral qualities? What is the relation between physical, mental, and motor capacities? Is the child of superior intellectual ability, for example, likely to be taller, heavier, or have more motor skill than the child of the same chronological age but of less mental ability? Is there any

significant relationship between the child's body build and his temperament or personality? If so, what is it? Does his kind of physique help determine his morals? To what extent are all his traits coordinated or correlated — his physical, mental, social, moral, and other qualities? Is maturity general or specific? May we speak of a general maturity, or should we say "maturities"? If maturity is general, what is its unique index?

Compensation a Popular View. The doctrine of compensation is a widely accepted belief concerning the organization of traits during childhood, adolescence, and adult life. Many people believe that the child who has a deficiency in one trait must always excel in another; that he who excels in one ability or quality necessarily lacks in some other equally desirable one. According to this comforting but erroneous theory, nature is essentially fair and just to all. The bright boy's superior intellect is often believed to be in striking contrast with his small and weak body, whereas the boy of average intelligence is supposed to have a far superior physique. The great thinker, the man of powerful intellect, is often thought of as being very absent-minded or impractical, as being in poor physical condition, or as having a countenance "sicklied o'er with the pale cast of thought"; whereas the man of average intelligence is believed to be physically robust and vigorous. Many popular phrases or sayings are based upon this view, such as "slow but sure," or "haste makes waste." Many people believe that the bright child usually doesn't turn out as well as the average child.

While popular fancy still clings tenaciously to the doctrine of compensation, scientific study of the problems of human growth and development gives little evidence supporting it. Inverse relations between various kinds of traits are not often found, as we see presently. The high negative correlations ²

² The coefficient of correlation is a numerical expression of the degree of relationship between two traits and may vary from perfect positive (+1.00) through zero (00) to perfect negative (-1.00). Perfect positive correlation means that each individual of a group has the same ranks on the two traits, that is, that the child ranking first on the one trait ranks first on the other trait; that the child ranking second on the one trait ranks second on the other; and so on for the entire group. Perfect negative correlation means just the opposite. The child ranking first on one thing ranks last on the other; the child ranking second on the one thing ranks next to last on the other;

required to support the doctrine simply are not found when valid, reliable measures of children's traits, abilities, and capacities are used.²

Is Physical Maturity General or Specific? Some physical traits are closely related during childhood, as, for example, height and weight, height and breathing capacity, and weight and chest girth. Other characteristics are less closely related, as height and certain strengths, and breathing capacity and strength of arms. In Table 20 is presented evidence showing

TABLE 20. MEAN CORRELATIONS BETWEEN CERTAIN PHYSICAL TRAITS
FOR AGES SEVEN TO NINE, AND AGES TEN TO TWELVE

N = approximately 50 to 60 of each sex at each age

(From Baldwin, 1921)

	AGES 7-9		AGES 10-12	
	Boys	Girls	Boys	Girls
Height — weight	866	611	830	.637
Height — breathing capacity	800	546	757	.710
Height — sitting height	944	821	924	.897
Height — chest girth	665	547	670	.487
Height — strength right arm . . . . .	.593	670	.583	.515
Height — strength left arm	.513	634	.518	.451
Height — strength upper back . . . . .	.436	495	.579	.448
Weight — breathing capacity	745	513	713	.564
Weight — sitting height	830	542	788	.652
Weight — chest girth	838	897	864	.919
Weight — strength right arm	692	490	633	.507
Weight — strength left arm	615	451	.583	.514
Weight — strength upper back	533	430	621	.384
Breathing capacity — sitting height	796	565	727	.612
Breathing capacity — chest girth	.677	557	.683	.476
Breathing capacity — strength right arm	.569	.485	.562	.461
Breathing capacity — strength left arm	.529	.470	.485	.434
Breathing capacity — strength upper back	.474	.529	.603	.411
Strength right and left arm	.822	.827	.764	.812

and so on for the entire group. The relationship is completely inverse. Zero correlation means that the child ranking first on the one trait may rank first, tenth, or even last on the other, and the child ranking second on the one trait may rank twelfth, fifteenth, or third on the other; that is, that there is no relationship between the two traits.

² The doctrine of compensation in the organization of traits should not be confused with the mechanism of compensation found in adjustments to overcome feelings of inferiority, as described in Chapter XVI.

that certain physical traits are closely correlated, while others are not. Height and weight are seen, by these correlations, to have much in common. This fact is confirmed by the observations recorded in Tables 21 and 22. Certain measures of strength, as those of the right and left arm, also show substan-

TABLE 21. THE INTERCORRELATIONS OF HEIGHT AND WEIGHT OF GIRLS
(Brooks)

AGE	N	CORRELATION BETWEEN HEIGHT AND WEIGHT	AGE	N	CORRELATION BETWEEN HEIGHT AND WEIGHT
10	20	.835	12	46	.717
12	20	.845	14	46	.704
11	57	.739	13	29	.887
13	57	.797	15	29	.804
Mean		.791			

TABLE 22. THE CORRELATION OF HEIGHT AND WEIGHT AT INTERVALS OF ONE
AND TWO YEARS IN THE CASE OF GIRLS, AGES TEN TO FOURTEEN YEARS
(Brooks)

CORRELATION BETWEEN	N	r
Height at 10 and weight at 11	20	.828
Height at 10 and weight at 12	20	.879
Height at 11 and weight at 12	77	.775
Height at 11 and weight at 13	57	.778
Height at 12 and weight at 13	103	.786
Height at 12 and weight at 14	46	.745
Weight at 10 and height at 11	20	.736
Weight at 10 and height at 12	20	.719
Weight at 11 and height at 12	77	.728
Weight at 11 and height at 13	57	.660
Weight at 12 and height at 13	103	.713
Weight at 12 and height at 14	46	.646
Mean correlations:		
Height and weight 1-year interval	796	
Height and weight 2-year interval	801	
Weight and height 1-year interval	726	
Weight and height 2-year interval	675	

tial relationship. On the other hand, height and weight are much less closely associated with the more dynamic features of strength. Table 23 shows the considerable consistency of development of height and weight from year to year. Meredith³ found that boys' individual curves for height crossed very little between six and eleven years of age and that stature could be predicted reasonably well, but that from eleven to eighteen years it could not be predicted with suitable accuracy. Boynton,⁴ however, found that reasonably accurate prediction of stature of girls at eight or nine years could be made from height at six years but not from height at five years, and that height at ten, eleven, or twelve was not closely related to height at six — the individual growth curves crossing a great deal at these later ages.

TABLE 23. THE CORRELATION OF HEIGHT WITH HEIGHT AND OF WEIGHT WITH WEIGHT AFTER INTERVALS OF ONE AND TWO YEARS IN THE CASE OF GIRLS, AGES TEN TO FOURTEEN YEARS

(Brooks)

CORRELATION BETWEEN	N	r
Height at 10 and at 11	20	848
Height at 10 and at 12	20	909
Height at 11 and at 12	77	919
Height at 11 and at 13	57	.838
Height at 12 and at 13	103	943
Height at 12 and at 14	46	905
Weight at 10 and at 11...	20	.985
Weight at 10 and at 12	20	937
Weight at 11 and at 12	77	976
Weight at 11 and at 13.	57	942
Weight at 12 and at 13	103	971
Weight at 12 and at 14	46	925
Mean correlations:		
Height 1-year interval...	903	
Height 2-year interval	884	
Weight 1-year interval	977	
Weight 2-year interval	935	

³ *The Rhythm of Physical Growth*, p. 118.

⁴ *The Physical Growth of Girls*, pp. 89-91.

The evidence in these tables and that from other studies⁵ indicate that *no one physical measurement* can be used as an accurate index of a child's status in *all other physical traits*, because not one of them correlates closely with every other one at each age during childhood. Physical traits, however, usually are positively related, and the relationship between some of them is very close indeed.

Other physical and motor capacities usually are positively related, but the correlations vary widely, lending support to the view that physical maturity is specific rather than general. We probably should speak of physical *maturities* if we would be very accurate. Many traits are so loosely related that one cannot be used to predict another. It was pointed out in Chapter V that different parts of the body have their own rates of development which vary at different ages, and that the child at any age may be nearer maturity in one physical trait than in another.

The Organization of Motor Capacities During Childhood. Some muscular strengths of children are closely related to breathing capacity, others only moderately, and some very loosely. Some motor capacities are only slightly interrelated, whereas others are more closely related. The motor speed and dexterity of children five and six years old were studied by using a battery of seventeen tests.⁶ The intercorrelations were all positive but ranged from .01 (between repetition of syllables, as in saying "Baa, baa, Black Sheep" as rapidly as possible, and tapping a bell with the left forefinger) to .83 (between putting marbles in a box with the right hand and with the left hand). The average correlation was .42. Among children, as among adults, motor skill is not unitary. The skills are more or less specific, some having much of a common ele-

⁵ For example, kindergarten and fourth-grade children in the Horace Mann School were studied by Gates (*Journal of Educational Psychology*, vol. 15, p. 339). The intercorrelations of seven physical traits (ossification of wrist bones, height, weight, chest girth, lung capacity, strength of grip, and nutrition) ranged from .11 to .83. The mean correlations of height, weight, and chest girth with the other traits were .47, .56, and .51, respectively.

⁶ See Gates and Scott, in *Journal of Genetic Psychology*, vol. 39, pp. 423-454.

ment, others very little, with many traits lying between these extremes. Apparently, as the child develops motor skills, he develops some of them in close coordination with others, but the majority of them are loosely integrated.⁷ The practical significance of this fact is that any desired motor skill or manual dexterity is not likely to be developed most effectively when practiced merely as a by-product of training to develop some other skill.

A significant fact set forth by Gates and Scott is that the closeness of organization of motor skills decreases as we pass from those which involve the same activity, the same part, and the same side of the body, to those which involve the same activity and the same part, but different side of the body, to those which involve different activities, different members of the body, and a different side of the body. The data from which these conclusions may be drawn are given in Table 24.

The Organization of Mental Abilities. Desirable mental traits are positively related during childhood. The child who can memorize well tends also to be the child who can reason well. The child who excels in giving close sustained attention also is likely to excel in judgment, perception, and the like. Of course, notable exceptions occur and are given much attention and weight by many persons. Thus, one particular child *may* have good rote memory, and yet be poor in reasoning ability. But the general fact obtained from the study of many children indicates that those having good reasoning ability have good memory. The positive association of mental traits is brought about by two influences. Many mental functions have some elements in common, for example, good reasoning is dependent in part upon having suitable basic facts, which, in turn, require close observation, accurate perception, and the re-

⁷ See also Goodenough and Tinker, in *Journal of Genetic Psychology*, vol. 38, pp. 146-159, for data showing that even speed of tapping is not a unitary motor skill, but that it varies according to the way in which it is performed, and the finger or hand employed. The correlations between tapping with different fingers of the same hand ranged from .58 to .86, averaging .72, with same fingers of different hands they ranged from .49 to .57, averaging .54, with different fingers of different hands they ranged from .16 to .62, averaging .46.

TABLE 24. THE ORGANIZATION OF CERTAIN MOTOR SKILLS
 THE AVERAGE CORRELATIONS BETWEEN MOTOR SPEED AND DEXTERITY WHEN
 THE ACTIVITY, PART, OR MEMBER OF BODY, AND SIDE OF BODY (1) ARE THE
 SAME, AND (2) ARE DIFFERENT

$N = 50$ children, ages 4.5 to 6 years

(Gates and Scott, *J. Genet. Psychol.*, vol. 39 (1931), p. 445)

1. Performances in same activity (tapping bell)	
<i>a.</i> With same member (hand, finger, foot)	<i>r</i>
(1) on same side (right or left) . . . . .	.82
(2) on opposite side . . . . .	.78
<i>b.</i> With different members	
(1) on same side . . . . .	.68
(2) on opposite side . . . . .	.64
<i>c.</i> With same member, one single and both alternately .	.56
<i>d.</i> With different members, one single and both alternately . . . . .	.56
<i>e.</i> With different members, both alternately . . . . .	.46
2. Performances in different activities	
<i>a.</i> Same member, but different side . . . . .	.46
<i>b.</i> Different members, but same side . . . . .	.42
<i>c.</i> Different activities, different members, different side	.27

memberings of past experiences. Then, too, training and education tend to produce a positive correlation between desirable intellectual traits, through the premium or reward placed upon them. That certain traits of the child are desirable simply means that they facilitate his adjustment to the conditions surrounding him. Accordingly, they tend to develop together. Experimental evidence gives no support to the doctrine of compensation. Some of the higher mental functions, such as those involved in altitude of intellect (see Chapter IX), are closely integrated. Others, such as altitude and speed of performance, are not so closely related. The child who works rapidly is likely, on the average, to be able to do somewhat more difficult tasks, but the correlations between speed and level of ability (difficulty) are likely to be approximately .50, which is too low to infer the one from the other, because of numerous exceptions. The old dictum "slow but sure" is the exception, not the rule. The rapid worker is likely to be the more accurate one. Table 25 shows some data concerning speed and accomplishment. Even sheer accuracy, in which the fast child might logically be

TABLE 25. THE RELATION OF SPEED TO ACCURACY IN ARITHMETIC
COMPUTATION IN GRADES FOUR, FIVE, AND SIX
(Brooks)

	N	CORRELATION BETWEEN	
		Number attempted and number right	Number attempted and ratio of rights to attempts
Grade 4	64		
Addition		44	.18
Subtraction		69	— 10
Multiplication		41	.11
Division	56	.52	.24
Grade 5			
Addition		54	.07
Subtraction		.89	.25
Multiplication	72	.77	.36
Division		80	.27
Grade 6	72		
Addition		70	.12
Subtraction		.78	.01
Multiplication		.70	.06
Division		90	.50

expected to be handicapped, is related to speed by correlations that are positive, though low.

Simple sensory capacities involving touch, hearing, vision, and the kinaesthetic sense are likely to be very loosely organized. Even certain features of mechanical ability are not closely related to such things as tying knots, solving mechanical puzzles, or handwriting, the correlations usually being approximately .30 or less.

Among pre-school children the various tests of memory span are related slightly (.20 to .40), moderately (.40 to .60), or more closely (.60 to .79), as shown in Table 26, which, however, is based upon too few cases to be conclusive. It suggests that the child's "memory" is not a unit trait. Instead, children seem to have abilities to remember particular kinds of material. Although most memory abilities are positively related, the correlations are far from the perfection assumed by those who speak of "memory" as if it were an entity.

TABLE 26.* INTERCORRELATIONS OF MEMORY SPANS OF PRE-SCHOOL CHILDREN, AS MEASURED BY TEN TESTS

 $N = 20$ (Hurlock and Newmark, *J. Genet. Psychol.*, vol. 39 (1931), pp 166-167)

	CONCRETE WORDS	ABSTRACT WORDS	SYLLABLES	PICTURES RECALL	LOGICAL MEMORY	COMMANDS	TAPPING	PICTURES RECOGNITION	DIGITS BACKWARD
Digits forward .	75	72	63	68	54	.47	50	11	- 90
Concrete words .		.53	70	57	56	51	47	37	- 80
Abstract words . .			63	50	57	66	52	33	- 90
Syllables				.68	59	63	45	.19	- 60
Pictures recall					54	79	63	37	- 60
Logical memory						44	56	31	- 90
Commands . .							.72	39	- 90
Tapping .								29	- 80
Pictures recognition.									- 40

* The correlations in the last column are quite unreliable, because 60 per cent of the children made zero scores — that is, could not repeat one of the three digits backwards.

The Integration of Character. The best available evidence⁸ indicates a wide variance in the organization of character traits, few of which bear any close relation to the others. Integration of character traits during childhood seems to be very slight indeed, that is, “general notions of goodness, general principles or rules of conduct, or general attitudes” are not functioning to provide responses to situations in accordance with “standards, ideals, or social laws.” Conduct during childhood tends to be specific, rather than to become generalized, although improvement is possible under appropriate conditions of training and education. However, any conclusions are highly tentative because the present measurements of character traits do not have adequate validity and reliability.

The Interrelations of Physical, Mental, Social, Emotional, and Other Traits. Physical traits and mental functions are slightly

⁸ See Hartshorne and May's three-volume work entitled *Studies in the Nature of Character*, listed in the references at the end of Chapter XIV, especially vol. 3, *Studies in the Organization of Character*.

related, as shown by a large amount of correlation data now available, and this slight correlation is positive.⁹ The popular view that the mental giant is a physical dwarf, and *vice versa*, has no foundation in scientific investigations. After the pioneer work of Porter¹⁰ and Baldwin¹¹ the older view of a high negative or inverse relation between physical and mental traits was thoroughly discredited in the minds of careful students of child growth and development. The opposite view, that of a high positive relation, however, is not supported by the facts now available.¹² Freeman and Carter¹³ correlated the ossification ratios¹⁴ and mental ages of twenty boys and twenty girls of each age from five to seventeen. Their results indicate that chronological age is slightly more related to mental age than is the ossification ratio.¹⁵ Both mental development and physical growth, however, take place during the same period of time, so that a wide range of ages during the period of growth tends to produce a high positive relationship between both kinds of traits. Two techniques may be used to avoid or eliminate this effect. The correlations may be taken for groups of children of the same age, or the effect of chronological age which is common to the mental and physical traits may be eliminated by finding the partial correlations.¹⁶ By "partialling out" chronological age, or by holding it constant, Freeman and Carter

⁹ See references at the end of this volume.

¹⁰ *Transactions of the Academy of Science*, St. Louis, Mo., 1893, pp. 161-181.

¹¹ *Physical Growth of Children from Birth to Maturity*.

¹² Gates (*Teachers College Record*, vol. 25, pp. 229 ff.) gives an excellent tabular summary of investigations made in the United States between 1893 and 1923. This is given also in Brooks, *Psychology of Adolescence*, pp. 140-143. See also Paterson, *Physique and Intellect*.

¹³ *Journal of Educational Psychology*, vol. 15, pp. 257-270.

¹⁴ Ossification ratio is the ratio of the ossified area of the wrist bones (as shown by radiographs) to the area of a certain "carpal quadrilateral." It is used to eliminate the influence of differences in general size of skeleton.

¹⁵ The correlations between mental age and ossification ratio were .73 for boys and .75 for girls, between mental age and chronological age, .82 for boys and .83 for girls.

¹⁶ Partial correlation is a statistical device by which the correlation between two traits or variables is freed from the common effect of one or more other variables or traits. It really shows the relation between two traits for individuals who are alike in a third trait (or a fourth trait, etc.). Its use helps to prevent wrong interpretations of interrelationships.

found that mental age and ossification ratio of wrist bones bear little relation to each other ($r = .084$ for boys and $.088$ for girls).¹⁷

Gates's¹⁸ results on fifty-eight junior-primary and fifty-seven fourth-grade pupils of the Horace Mann School agree closely with those of Freeman and Carter. Ossification ratio, height, weight, chest girth, lung capacity, grip, and nutrition showed very low positive correlations with mental age and educational achievement, none of them as much as $.20$. The multiple correlation of mental age with these seven physical measures was $.21$, a coefficient whose predictive value is only 2 per cent better than guessing.¹⁹ The author found no evidence of a close, positive relation between mental age and either height, weight, or speed of motor reaction (measured by three trials of 20 seconds each tapping) in the case of 327 children in grades four and five, the correlations usually being positive, but low.²⁰ Apparently, the relationships are no higher during the pre-school years. Jones,²¹ in the California growth study, found no significant correlations between intelligence and ossification of the epiphysis of the upper tibia at twelve, twenty-four, and thirty-six months. Girls' skeletal development was faster during the pre-school period than that of boys, but it was not paralleled by a more rapid mental development. Jones says, "In the light of this and of the foregoing studies there appears to be little justification, at any age level, for attempting elaborate composites of X-ray measures in the hope of obtaining significant correlations with intelligence."

¹⁷ Baldwin's correlation of $.87$ between ossified areas of wrist bones and mental ages of 49 girls, ages 7 to 17, reduced to $.09$ when chronological age was held constant or "partialled out."

¹⁸ *Journal of Educational Psychology*, vol. 15, pp. 329-358.

¹⁹ A correlation of $.21$ between two traits means a coefficient of alienation (see p. 541) of $.98$ which indicates that estimates of mental age based upon knowledge of the seven physical measures would be, in the long run, 98 per cent as inaccurate as guessing.

²⁰ See also the work of Cattell (*Dentition as a Measure of Maturity*), Prescott (*The Determination of Anatomical Age in School Children and Its Relation to Mental Development*), and others cited in the references at the end of this chapter. An excellent review of important investigations to December 1935, is given by Jones in *Review of Educational Research*, vol. 3, pp. 150-162, and vol. 6, pp. 102-123.

²¹ *Op. cit.*, p. 157.

When children are divided into groups having high, average, and inferior intelligence, the average height, weight, or other physical measure of the brighter group exceeds that of the average group, which, in turn, usually exceeds that of the dull group,²² but there is too much overlapping of groups for accurate prediction or classification in mental traits upon the basis of physical measures.

Emotional maturity²³ seems to bear some relation to intelligence, but we cannot be sure exactly what this relationship is, because of conflicting results from many studies. Weber reports a correlation of .60 between Wells's emotional age scale scores and intelligence in the case of 235 pupils in grades 6, 8, 10, and 12, chronological age being held constant by the partial correlation technique. We found²⁴ emotional stability at the beginning of adolescence, as measured by the Mathews-Woodworth personal data questionnaire, to correlate slightly negatively with mental age.

Various personality traits such as initiative, aggressiveness, leadership, self-confidence, cooperation, trustworthiness, respect for authority, ability to get along with others, etc., show positive association with intelligence, varying from around .50 to as low as .10.

Information on the Integration of Personality Traits Meager. Thus far, we have discussed the integration of personality traits of children as if modern psychology really has much valid dependable information about this topic and is in a position to give conclusive answers to questions on it. We have either reported many correlations or cited the reader to investigations containing a vast array of them. Despite the knowledge derived from all of these studies with their long series of correlations, we should frankly admit the limitations of our knowledge, and be cautious about drawing conclusions. Many of our

²² See Goddard in *Journal of Nervous and Mental Diseases*, vol. 39, pp. 217-235; Hollingworth and Taylor, in *Twenty-Third Yearbook*, Part I, National Society for the Study of Education, pp. 221-237; and Kempf and Collins, in *A Study of the Relation between Mental and Physical Status of Children in Two Counties of Illinois*

²³ See Weber, in *Journal of Abnormal and Social Psychology*, vol. 27, pp. 65-78.

²⁴ *Psychology of Adolescence*, p. 428.

tests measure things which are true enough in the test situation, but which may not be equally true, applicable, or valid in the child's actual everyday practical living. We are on unsafe ground when we infer that the child possesses in actual life the same absolute amount or even relative amount of cooperativeness, or emotional stability, for example, as he shows on paper and pencil tests, or in other narrow test situations. The traits thus measured and correlated really may function somewhat differently in actual life. Accordingly, our conclusions on integration must be regarded as tentative.

2. PERSONALITY AND LEVELS OF INTELLIGENCE

Personality Traits of Intellectually Gifted Children. Popular opinion probably is nowhere more in error than in its appraisal of the personality of mentally gifted children whose intelligence seems to be regarded almost as a handicap in developing an effective personality. As nearly as can be determined from the available evidence, the chief differences between the traits of mentally gifted and mentally average children relate to intellectual interests and abilities. Other qualities of personality vary widely. We have on file several hundred individual case-study or observation reports on children from infancy to the age of twelve years. From them we have drawn the following accounts which give some indication of the wide range of traits found among children of superior intellectual endowments. They should be compared with the case studies of children of average and below average mentality which follow in the next section.

1. Edward T., age three years, two months, Stanford-Binet I.Q. 143, is the second child in a family of three boys. He is well-developed physically and in good general health. He is an aggressive, pugnacious little fellow who seeks to dominate the few children with whom he plays. He is impatient and given to fits of anger and jealousy but seems to be improving in this respect. When his younger brother was born a year ago, Edward was terribly upset and had to be watched constantly lest

he do him some harm. For several months he could hardly tolerate being near the baby. His parents realize his egocentrism and have been trying to overcome it, but they are handicapped by being unable to send him to a nursery school where experiences with other children would help him outgrow his social and emotional immaturity.²⁵

2. Joan L. had a Stanford-Binet I.Q. of 137 when tested at the age of three years and five months. She was the only child in a good middle-class family. Joan was slightly more than one year above the age norms for height and weight. She was round-faced, chubby, in excellent health, and full of energy. She liked to play with other girls and had many friends who liked to play with her. Having a calm, even, sunny disposition, she did not like quarreling and was a good peacemaker among little tots her own age. She had to learn to take her own part but seldom resorted to force. She had an unusual sense of rhythm and seemed to have considerable ability in music which was clearly evident at the age of five but even more conclusively shown at eight when she began studying music in an excellent conservatory. When she was three years old, her vocabulary development was above the five-year level. Her conversational ability was much above the average. Joan had varied interests, expressing a liking for all kinds of toys, dolls, building blocks, trains, automobiles, kiddie car, painting and drawing sets, and modeling clay. Her favorite occupations were playing in the sand pile, running, climbing, swinging, going to the park, and going for walks. Fear of the dark and fear of animals were unknown. She had been knocked down by a huge dog, but felt no fear because she liked dogs. She explained to her mother that a dog was playing and had knocked her down, but didn't mean to do it.

3. Elizabeth R., age six years, two months, Haggerty I.Q. 135, was normal in physical development, and was in good health. She was strong and energetic, enjoying vigorous games, climbing, skating, and turning somersaults. She was reserved

²⁵ See also Woolley, in *Pedagogical Seminary*, vol. 32, pp. 569-598, for an account of a dominant personality in the making.

with strangers, but very friendly with acquaintances. She played well with a few companions. She was attractive, courteous, generous, and kind to others. She showed unusual mental ability. She read eight readers and several other books in less than a half year. Her vocabulary, powers of conversation, and appreciation of literature were much above average.

4. Charles F., age six years and one month, Stanford-Binet I.Q. 142, the son of a physician (who was firmly set in his ways), missed much time from school on account of illness, but his health, at the time of this record, seemed to be improving. He never was allowed to play with children and did not care to do so. He was badly spoiled. He was shy, hard to get acquainted with, very sensitive, extremely nervous, and easily frightened. He cried at the least thing. He had considerable special aptitude in drawing, and his general school work was uniformly good.

5. E. J. at the age of six years and four months had a Stanford-Binet I.Q. of 132. He came from a good home. His health was good, although he was subject to many colds. He was large for his age and was well built. His play interests were varied, and he liked to participate with other boys in all the things normal boys like. His school work was excellent. The teacher found it difficult to keep him busy and out of mischief, for he finished his regular assignments before the rest of the group. Having little to occupy his time, he began to be inattentive and to daydream in school. He was given an extra promotion, and under the stimulus of more difficult work the daydreaming disappeared.

6. Betty H., age seven years and four months, Stanford-Binet I.Q. 125, is the only child of over-indulgent parents who have little control over her. She is well-developed physically, being above average in both height and weight and is in excellent health. She has had very little opportunity to play with children except at school. She does not cooperate well with other children, as she wants to be in the limelight all of the time. Often she plays unfairly and uses unkind methods of retaliation such as tripping, or spitting in another child's face. She is

neither timid nor shy. She becomes angry very easily but gets over her tantrums quickly. She does good work in school but is inclined to be slipshod, rushing through extra assignments. She has become very unpopular because of her disregard for the rights and feelings of others. She has thought nothing of smearing a picture upon which another child has worked very hard. She is beginning to get some insight into her unpopularity and seems to see the need of playing fair.

7. Warner H., at the time this record was made, was eight years, three months of age. His intelligence quotient on the Stanford-Binet scale was 133. He was well-developed physically, in good health, doing excellent work in the high fourth grade. His play interests were normal. He was even-tempered, got along well with boys his own age and with those a little older, playing with them a great deal. He was neither timid nor forward. He did not seek the limelight although he was a leader in games and school activities. He was full of life and energy and had a keen sense of humor. He seemed to be as dependable as most boys of eight or nine years. He was kind to others and usually courteous.

8. Helen A., age nine years and eleven months, Stanford-Binet I.Q. 122, was slightly above normal in height and weight. Her health was excellent. She was doing very good work in the high fourth grade, where she was regarded as quite industrious and attentive. She had much initiative and started many new things in the classroom, but often dropped an activity and tried to start something else as soon as she had followers. Her use of English was excellent, and she had considerable maturity of judgment. Helen's chief faults were that she was somewhat untidy, lacked self-control, and was easily excited. She insisted that everyone else play fairly in games, but did not always play fairly herself. She often was unselfish and shared her things with others. She was a leader and knew it. She mixed well with other pupils, but let them know that her father was wealthy. She usually was truthful, honest, and adapted herself to new situations. At home she was very aggressive, easily angered, and often stubborn, but did not show these

traits at school. She had no fears. She was restless and active and preferred to play with boys. She had two brothers, one older and one younger, both very superior intellectually. She made friends easily and was very demonstrative. In school work she did not show strong likes and dislikes. Within a year after these data were gathered her mother died and her father remarried. Helen was much disturbed at first, but soon readjusted. At one time, during a period of one month, she cut her leg on a nail while rolling down the driveway in a barrel, cut her index finger while making a wooden spear, and cut her leg again on a nail while climbing over a fence. In all three cases stitches were taken to close up the wound. She seemed not much disturbed by these incidents.

9. Louise C., age ten years, five months, was doing excellent work in sixth grade. Her Stanford-Binet I.Q. was 144. Her father was a laborer. Both he and the mother had finished eighth grade and were anxious for Louise to do good work. She was normal in physical development and general health. She ranked second in her class in scholarship. She liked to read and to take part in dramatics. She brought a Latin grammar to school and in her spare time tried to study and understand it. At times she seemed self-centered. She had some friends but not as many as most children her age. She had little interest in athletic games and contests and took part in them only as part of school routine. Her spare time was spent in reading.

10. Evelyn J., Stanford-Binet I.Q. 129, at the age of eleven years and eleven months was leading her class in the first year of junior high school. Her height was normal, and in bodily build she was thin, muscular, and healthy. Throughout her school career she has led her class in scholarship, with the exception of a few weeks at the beginning of the fifth grade after she had skipped the second half of the fourth grade. She has always shown much interest in games and in other children. In seventh grade she enjoyed dodge-ball, tennis, baseball, hide-and-seek, skating, climbing, jumping rope, swimming, running races, checkers, and guessing games. She was truthful,

sometimes blunt of speech, and had an appreciation of humor and good literature. She was a little self-conscious. She had not reached puberty. She got along well with others and divided her leisure between reading and playing with other children. She has two older sisters and a younger brother.

11. Robert S., age twelve years, two months, Stanford-Binet I.Q. 133, was doing excellent work in the second year of a large junior high school when this record was made. He has a brother a year and a half older than he. He was large for his age, well-built, and greatly interested in playing football, baseball, and other games normally played by boys his age and size. He was a thoughtful, dependable, polite, kind, generous, obedient, industrious, manly fellow who had many friends. He had special talent in drawing and attended art school during the late afternoon hours and on Saturday mornings. He read widely, being much interested in travel, geography, and history. His was a normal or above average personality.

These case studies are more or less typical of what is found among children of marked mental ability. They indicate that such children are likely to reveal a wide variety of personality traits, such as are found in children of average mentality. When bad home environment surrounds them, they take on undesirable traits. Having good minds, they can learn readily. They can learn bad habits, or good habits, depending upon the kind of training they have, and on its effectiveness. Other studies²⁶ by group methods have provided information on larger numbers of intellectually gifted children. They corroborate our own case studies. For example, Terman and Goodenough found that gifted children had better ratings than the children of average intelligence in a great many traits, such as health, physical energy, prudence and forethought, self-confidence, perseverance, appreciation of music and beauty, sense of humor, cheerfulness, leadership, sensitiveness to approval and disapproval, sympathy and tenderness, truthfulness, desire to excel,

²⁶ See, for example, Terman and Goodenough, in *Mental and Physical Traits of a Thousand Gifted Children*, pp. 519-555, and Terman, *Intelligence of School Children*, chap. 10.

conscientiousness, originality, common sense, and, of course, general intelligence. The children of average mentality excelled the gifted ones in fondness for large groups. Both groups had the same ratings in freedom from vanity and egotism, generosity and unselfishness, popularity, and mechanical ingenuity.

Apparently, then, intelligence is not a handicap in developing a wholesome, effective personality, nor is superior mental ability likely to prove deleterious to the child if those who have charge of his care, training, and guidance use suitable intelligence and wisdom.

The Personality Traits of Children of Average Mental Ability. From the material presented in the preceding topic, one would expect the child of average mental ability to be slightly below the superior group in some personality traits and to excel children of lower mental capacity in some. The overlapping is noteworthy, especially with respect to traits whose development is not dependent upon the child's possession of an unusual degree of intelligence. Apparently, many moral traits are possessed by children of average intelligence in as large a measure as by those having a higher degree of mental ability.

We give a few individual case studies.

1. Ruth R., age four years, three months, Stanford-Binet I.Q. 106, physical development normal, general health good. The youngest of two boys and three girls, in a good home, with many opportunities to play with other children. She has had normal social and emotional development. She is quite self-reliant and cooperative. She is less egocentric than the average child of her age. She adapted herself readily to kindergarten, which she entered two months before this record was made. She has a wholesome disposition and seems normal in every way.

2. George S., age five years, two months, Stanford-Binet I.Q. 94, showed normal physical development and good health except for many colds. He gets along well with children his own age, with whom he plays a great deal. He is careless and irresponsible, but generally happy, is frank and usually truth-

ful. George is quick to get angry, but his anger soon subsides. He is in kindergarten and seems to be improving in the ability to bear responsibilities which relate to group activities. He is the third in a family of four children, and his home conditions are better than the average.

3. Grant R., age six years, four months, Stanford-Binet I.Q. 97, was of normal height, but seven pounds underweight, being very slender like his father, mother, and two older brothers. His health had been uniformly good. He had just been promoted to high first grade. He did not like to play in groups, although he spent five months in kindergarten. He preferred one companion with whom he spent much of his spare time out of school. He liked to play alone at home with various toys, possibly because his older brothers took great delight in teasing him. He was sensitive, somewhat shy and reserved, did not make friends easily, but retained them well. He seemed cheerful and happy most of the time. He was truthful and was generous with his closest friends.

4. Peggy L., age six years, Pintner-Cunningham I.Q. 101, an only child in a large family of uncles and aunts, was large for her age and in fair general health. She was not allowed to play with other children. She was often taken to parties at night and kept up until very late. She lacked self-confidence and often cried at school when given some work to do, declaring that she could not do it, even though it was very easy. Peggy had no play interests at school and usually preferred to be alone. She had few friends, none of them close companions. She was good in handwork and liked it but did only fair work in reading. She was truthful and industrious, although she thought she could do nothing well and was much bothered by this belief.

5. Irvin L., age nine years, four months, average I.Q. on Illinois and National Intelligence tests 106, was doing average work in lower fourth grade. He was slender but of normal weight. He was a nervous child, continually moving his hands and feet. Lack of motor coordination was apparent when he walked. He did not get along with other children and usually was involved in an argument with someone. He always

thought he was right. His mother left the family when he was very small, and thereafter he was cared for by a careless grandmother. His father gave him plenty of spending money but thought his responsibility toward the boy ended there. Irvin nearly always came to school without his breakfast because the rest of the family were not yet up. He cared nothing for his home and spent his time out of school roaming the streets. He felt the world was against him and was always ready to fight. He was very stubborn and would do only what he wanted to do. His chief pleasures were spending money, going to the movies, and buying candy and cake. He had good reasoning ability and always wanted to know the reasons for anything. He enjoyed being noticed and craved attention and approval.

6. Lawrence R., age ten years, Stanford-Binet I.Q. 107, was two inches taller and twelve pounds heavier than normal. He was in good general health, although recently he had suffered from mumps, pneumonia (followed by temporary paralysis), and two severe attacks of grippe. He was a fine looking boy with black hair, dark eyes, and rosy cheeks. His school work was slightly above average in the high fourth grade. He was lazy, slow, stubborn, noisy, sullen, and quick-tempered. He liked to bully and fight smaller boys and girls and did not get along with other boys of his own age. He was generally truthful, although he might refuse to answer questions and remain quiet and sullen.

7. Louis E., age eleven years, nine months, Stanford-Binet I.Q. 98, was doing very good work in lower sixth grade. He was short for his age, but of normal weight, had no physical defects, and was in good health, although slightly nervous. His parents were very strict and did not allow him to play much with other children. At school, however, he took great delight in games and in being with other boys. He was generally liked by other children. He was quick-tempered but easily got over his anger. He was truthful, frank, fair, and considerate of others. He liked to lead but did not seek the limelight for himself. He enjoyed school greatly and was one of the first to come in the morning and the last to leave in the after-

noon, probably because of associations with other boys which he lacked at home.

8. Marie S., age twelve years and one month, Stanford-Binet I.Q. 91, was doing average work in the lower sixth grade. Her height was normal, and her weight nine pounds above normal. She was friendly and had many girl friends with whom she played a wide variety of games. She was indifferent to much of her school work, doing it more from a sense of duty than from interest in it. She was truthful, responsible, cooperated well, had some ability in music, and seemed unselfish much of the time. Sometimes she was very abrupt in speaking, but usually she was calm and self-controlled.

Personality Traits of Children Who are Below Average in Mental Ability. As we go down the scale of intelligence to the dull normal and feeble-minded children, we begin to see the rôle of intelligence in personality. Among the lower grades of feeble-mindedness some characteristics of human personality begin to disappear, as may be seen in the case studies to be given presently. The personalities of dull normal children, however, are not so very different in some respects from those of children having more mental ability. In non-intellectual traits these differences are less marked than in mental characteristics and school achievement.

1. Mary E., age four years and one month, Stanford-Binet I.Q. 86, was an attractive, healthy, well-developed little girl who enjoyed playing with dolls, her kiddie car, and other toys. She was somewhat dependent upon her older sister for protection in playing with other children. She was kind, affectionate, and peace-loving, but lacked normal aggressiveness and was easily imposed upon by more self-assertive children.

2. Gladys A., age seven years, three months, Pintner-Cunningham I.Q. 76, was in the low first grade in school and doing very poor work. Her physical development was normal and health was good. She was stubborn and slow. She had a few good friends with whom she liked to play. She made friends with difficulty and preferred being alone to making new acquaintances. Usually she was contented, and generally avoided

difficulties with other children. She was unattractive, awkward, and lacked interest in school work, although the teacher was very competent and took pains to adapt the teaching to her level of ability. She was interested in handwork, but cared nothing for reading or numbers. She did not cooperate in school and showed no initiative.

3. Ralph R., age seven years and nine months, Stanford-Binet I.Q. 67, spent one year in the lower first grade and was just completing one year in the high first grade. He was fifth in a family of eight children. He was undernourished and underweight, very nervous and irritable. He had no initiative, independence, or ability to concentrate, but was kind and sympathetic. He was quick to become angered, but very sorry afterward, even crying over his flare-ups. He was timid about meeting strangers. The home conditions were very poor, and all the children have been sickly. A brother nine years old was in a state school for the feeble-minded and had an I.Q. of 52. Ralph liked active children's games, apparently just for the activity. A year later, St. Vitus dance (chorea) developed and was followed by a long period of recovery. His school work did not improve, however, and his mental level remained the same.

4. Earl J., age eight years and four months, Stanford-Binet I.Q. 54, failed lower first grade and has been in a special class ever since. His work is still equivalent to that of the low first grade, even after two and one-half years in elementary school. He is in good general health but has a thumb-sucking habit which has been impossible to break. His mother reports that his early development was normal until the age of eighteen months when he licked wet paint from a metal bed, and "had lead poisoning which affected his mind." This is probably a rationalization, rather than a real explanation of his trouble. An older brother progressed in school very slowly. Earl is dependent on others, lacks self-control, does not cooperate, is restless, cannot concentrate his attention, and does not get along with children his own age. He cannot follow simple directions without several repetitions and much urging and encouragement. He generally is quiet and unobtrusive.

5. George R., age ten years, ten months, Stanford-Binet I.Q. 71, was unable to do the work in the slowest section of the low fourth grade. He was in good physical condition, except for a visual defect which necessitated glasses. He was very quiet and reserved and tried to avoid other children. He had no close friends. He had some ability in handwork. His chief interest was to make wagons and ride in them. He played alone or with his little brother, aged two years. He was unattractive and lacked initiative, normal aggressiveness, and self-assertion. He enjoyed commendation but made little effort to excel or to secure it. He was placid and seemed to have no strong fears.

6. Dorothy G., age eleven years, Stanford-Binet I.Q. 74, was doing fair work in the slowest section of the high fourth grade. She was tall, well-built, and in excellent health. She was neat, attractive, well-dressed, and usually talkative. She wanted always to be the leader, but she had only fair ability even in a group composed of children of like mental level. She was quarrelsome when not allowed to be leader. She was dependable at times and seemed to have considerable self-control and independence. She usually had the things she wanted, but, according to her mother, she had been taking things from other children for a long time. If she could not secure something that she wanted by trading, she would steal it when the opportunity occurred. She was at times adept at lying.

7. Georgia M., age twelve years and one month, Stanford-Binet I.Q. 82, was of normal height but was eight pounds underweight. She had bad tonsils and adenoids. Before entering school she had infantile paralysis, spinal meningitis, and chicken pox. She was totally blind for five months. At the time this record was made she had little control of her feet, often stumbling or being unsteady on them. She was doing fair work in the middle section of the high fifth grade. She was very shy in class, but when with one or two children she was very friendly. At home she was very "bossy" and seemed to dominate her father, mother, and younger brothers and sisters.

8. Ruth Y., age twelve years, Stanford-Binet I.Q. 42, would be classed in the "imbecile" grade of feeble-mindedness. She was in the high first grade in the public schools of a small city. She was underdeveloped physically but had good general health. Her father was slightly above average in intelligence; her mother, considerably below the average. Ruth was bold, irresponsible, unattractive, untidy, cared little for friends and had few. She was stupidly untruthful, unimaginative, and seemed to be unafraid. She was not cooperative. She cared nothing for play activities but preferred to stand with mouth agape, idly watching others or merely looking into space.

9. William W., age twelve years and six months, Stanford-Binet I.Q. 21, was very nearly of the "idiot" class of feeble-mindedness. He had attended school in a small town for most of six years and had reached the high first grade, apparently promoted because of long and faithful service in the low first grade. He was, of course, entirely a misfit and should not have been in a class with children six and seven years of age. He had no idea what school was about. He had no observable play interests. He spent most of the time at school with his mouth half open, apparently deeply absorbed in an idiotic stare. He lacked motor coordination and could hardly walk by himself. He had no friends among the children at school. He knew so little of what was going on about him that there could be no basis for judging such traits as truthfulness, dependability, or cooperation. These characteristics simply did not exist, positively or negatively. He was placid, apathetic, and unable to defend or protect himself, even when with children six or eight years old. His eyes were watery and had the appearance of sagging in their sockets. He was slovenly and usually dirty. His characteristics illustrate the fundamental importance of some degree of intelligence for the very existence of traits of human personality.

3. PERSONALITY TRAITS OF DELINQUENT CHILDREN

Physical Traits. We have shown elsewhere²⁷ that juvenile delinquents are not set off from the non-delinquents by any anomalies of physique. On the whole, they are often above average in height and weight,²⁸ but sometimes have more physical defects than the non-delinquent. Either marked physical over-development or under-development may be a contributing cause of delinquency.

The Intelligence of Delinquents. Our own case studies of children and adolescents together with the many extensive investigations of others²⁹ give little reason for accepting the earlier views³⁰ that from one-half to two-thirds of the juvenile court cases are feeble-minded. In fact, the intelligence of delinquents, while having an average inferior to that of non-delinquents, overlaps that of the latter a great deal. The majority seem to be of normal intelligence or above.

*Other Traits.*³¹ Delinquent children have many personality traits in common with the non-delinquents. Delinquency is a form of social maladjustment. Accordingly, we may expect to find significant differentiating characteristics in the child's social development and morals. The following traits have been found present among delinquents: love of adventure and excitement, impulsiveness, stubbornness, violent temper, egocentrism, revengefulness, social suggestibility, oversensitiveness, disrespect for authority, and inability to plan new work or shape situations. Sometimes capacity for leadership is

²⁷ *Psychology of Adolescence*, pp 398-409.

²⁸ Burt, *The Young Delinquent*, p 238; Faber and Ritter, in *American Journal of Diseases of Children*, vol. 14, pp 444-462, Healy and Bronner, *Delinquents and Criminals: Their Making and Unmaking*, chap. 14; Mathews, in *Journal of Delinquency*, vol. 8, pp. 196-231.

²⁹ See, for example, Brooks, *op. cit.*, pp. 404 ff.; Healy and Bronner, *op. cit.*, chap. 16; Miner, *Deficiency and Delinquency*, chap. 6; and Rogers and Austin, in *Journal of Juvenile Research*, vol. 18, pp. 103-106.

³⁰ See Goddard, *Juvenile Delinquency*.

³¹ See Brooks, *op. cit.*; Daniel, *A Psychological Study of Delinquent and Non-Delinquent Negro Boys*, Glueck and Glueck, *One Thousand Juvenile Delinquents*; Healy and Bronner, *op. cit.*

found and sometimes lack of this capacity. Generosity, kindheartedness, selfishness, cruelty, slyness, deceitfulness, boldness, and frankness are found in various combinations. However, these same traits may be found in those who do not transgress the moral and civil laws. Delinquency seems to be the outcome when a combination of traits operating under given environmental conditions leads the individual to solve his problems in various socially disapproved ways. Obviously, the careful observation of behavior trends is needed at all ages of childhood and adolescence, and the more potent causes of delinquency must be guarded against. A positive program of prevention is needed rather than merely corrective work after the child becomes delinquent. The complexity and artificiality of highly civilized life put increasing demands for social adjustment upon child nature. That many children do not make the proper adjustment is well known. It is also well established that many of those who fail morally might have succeeded under appropriate guidance. Society's interests are at stake, and society will have to be alert, resourceful, and willing to give thought to this problem and to accept responsibility for suitable programs of prevention.

SELECTED REFERENCES

For reviews of the literature on the relationships between mental and physical development, see Jones, in *Review of Educational Research*, vol. 3 (April, 1933), chap. 4, and vol. 6 (February, 1936), chap. 6. For reports of many studies, see Paterson, *Physique and Intellect*.

Arrington presents data on the organization of traits in her monograph, *Interrelations in the Behavior of Young Children*; Terman *et al.* give data on the personality traits of gifted and normal children and on the relationships between various traits in *The Mental and Physical Traits of a Thousand Gifted Children*; Shirley, *The First Two Years*, vol. 2, *Intellectual Development*, chaps. 16, 18, also gives some data on this problem.

Since the studies on integration of traits, for the most part, are reported in various journals and monographs, see also the references at the end of this volume.

CHAPTER XIX

THE PREDICTION, GUIDANCE, AND CONTROL OF CHILD BEHAVIOR

THE ultimate practical aims of any scientific study are to facilitate the prediction and control of natural events. Child psychology should furnish information that will help in the prediction and control of child behavior. It is highly desirable that the accuracy with which we can predict various features of the child's growth and development be examined, and that the wisdom and effectiveness with which we control his behavior be improved. Unfortunately, accurate prediction is not possible in many of the most important phases of child behavior. In some functions, such as the physical, intellectual, and scholastic ones, predictions can be made accurately enough to be of some value. In relation to some other problems, especially to those of personality and character, exact information is so meager that forecasting cannot be done with a satisfactory degree of precision.

In the preceding chapters much material that deals with prediction and guidance has been presented. Accordingly, the present chapter attempts only to summarize the more significant information on predicting child behavior, and to consider briefly a few of the more important facts and principles which teachers and parents may use in child guidance and control.

I. THE PREDICTION OF CHILD BEHAVIOR

*Methods of Determining the Predictive Value of Knowledge.*² Present information may be used to predict some future event only if there is some significant relation between the first and second observations. Repeated observations are needed for reliable forecasting. We might observe that one six-year-old

² For a more extended discussion of this topic see Brooks, *Psychology of Adolescence*, pp. 544-551.

boy is very shy, but that at seven he is much less shy. It should not be concluded from such meager information that boys in general become less shy as they get older. Many more cases should be observed, and under a variety of carefully controlled circumstances, in order to justify such a definite conclusion. It is also necessary to be on guard lest we infer that because one event follows another the first is a cause from which the second may be predicted. Concomitance does not necessarily imply causation.

In some instances the predictive value of a factor may be determined by the comparison of groups. Thus, if we divided each one of a large number of classes in many schools (*a*) into three or more groups according to scores on a good intelligence test given at the *beginning* of the fourth grade and (*b*) into the same number of groups on a good measure of reading achievement at the *end* of the fourth grade, and if we found that all of the pupils in the highest section on the intelligence tests were in the highest section on reading achievement, that all of those in the second section on intelligence were in the second section on reading achievement, and so on for the other sections, then we would have some grounds for concluding that intelligence test scores can be used one year in advance to forecast fourth-grade reading achievement. If, however, 60 per cent of the pupils (or some other large proportion) were in a different section on intelligence from that on reading achievement, then we would say intelligence test scores had little value in predicting reading achievement in this grade.

The most common way now of determining the predictive value of anything is to calculate its coefficient of correlation with the thing to be predicted. If the correlation for an accurately described group (children of same age, grade, sex, etc.) is high between one factor measured now and a second factor measured at some later time (a half year, one year, two years, etc.), and this is almost invariably true, then we may conclude that the first one has value in forecasting the second.²

² See p. 512 for further discussion of correlation. See also Brooks, *op. cit.*, pp. 548-550, for discussion of use of the regression equation in prediction. See also these topics in standard textbooks on Statistics.

The Coefficient of Alienation. A coefficient of correlation of .50 between two traits may indicate that they have some positive relation to each other. They are not closely enough related, however, to enable one to predict accurately one trait from a knowledge of the other trait. Estimates based upon a relationship of this amount would be, in the long run, 13.4 per cent more accurate than guessing.

If we knew absolutely nothing about the abilities of the individual children in a group, but had reason to believe the group an average one, our best estimate of the ability of each child would be to guess that each one is at the average of the group. Our error of estimate then would be a minimum and would be the standard deviation of the abilities of the group. If, however, we knew something about each child's ability, we could estimate it more accurately than if we did not have such knowledge, and the error of our estimates³ would be less than before. The more that is known about each individual's ability the greater will be the precision of the estimate and the smaller its error. Absolutely accurate knowledge of the ability of each child in the group would enable us to make estimates having zero error.

The foregoing discussion should make it clear that in a number of instances where only a rough classification is required, as, for example, into three groups, making a prediction that is "13.4 per cent better than chance" may be useful although more conservative usage requires that prediction be at least 20 per cent better than guessing (that is the correlation be not less than .60).

The coefficient of alienation is $\sqrt{1-r^2}$ and expresses the ratio of the error of estimate based upon a given correlation to the error from mere guessing, as already described. Thus, if the

³ The error of estimate for a group is the square root of the mean of the squares of all the individual errors of estimate and is found empirically as follows. (1) Find the difference between each child's true score and his estimated score; these are individual errors of estimate. (2) Square the individual errors of estimate. (3) Find the sum of all these squares. (4) Divide this sum by the number of children in the group. (5) Extract the square root of the quotient found in (4); this square root is the error of estimate.

correlation between the intelligence test scores and the arithmetic scores of ten-year-old children is .50, the coefficient of alienation is .866. This means that estimating the arithmetic scores of ten-year-olds from a knowledge of their intelligence test scores would be .866 as inaccurate as if we guessed, or that the error of estimate would be .866 as large as if we guessed. The error of estimate would be decreased from 1.00 to .866, or by .134, or 13.4 per cent.

The coefficient of alienation is, then, very important in determining the significance of a coefficient of correlation for *prediction*, because it shows how much better than guessing is the prediction based upon a given coefficient of correlation.

Predicting General Tendencies vs. Predicting Individual Differences. It should be pointed out that a lesser degree of precision and knowledge is necessary for the prediction of general tendencies than for the exact prognosis of individual differences. The idea is widely accepted that children should not be allowed to have wet feet, since this may lead to colds. The validity of this concept does not necessitate that it must be true in one hundred per cent of the cases, or that the correlation between the wetness of feet and the frequency of colds must be a perfect one. Even if only ten per cent of children who have wet feet develop colds, it may still be worthwhile to take precautions against this factor. A number of psychological problems are very similar. It is quite well established that the excessive coddling and pampering of children by their parents may hinder the development of self-reliance, and that a severe attitude of inferiority may lead to the establishment of undesirable defense mechanisms. In discovering these general tendencies, great care should be taken not to jump to conclusions on the basis of too few cases, and not to confuse causal and incidental factors. The relationships demanded need not be very high, however.

In predicting individual differences among children, however, or individual scores, higher coefficients of correlation and more rigorous proof are demanded. More of such evidence is available in some fields of research than in others.

Predicting the Child's Physical and Motor Development. It has already been shown, in Chapters V, VI, and XVIII, that physical and motor development may be predicted with some certainty, despite variations among children in the rates of growth at different ages. During the first year a group of children showed considerable consistency in development of locomotion. They tended to maintain their relative positions. Those who crept at a relatively early age also walked at an early age. Those who stood with help at a relatively early age also walked alone at an earlier age.⁴ Correlations of .80 have been found between ages of standing with help and walking alone, and of .84 between age of creeping and age of walking. Height and weight at six, for example, are closely related to the same traits at the age of twelve (Baldwin's correlations from .73 to .82). Breathing capacity at six and at twelve, however, correlates only around .50, while strength of arms shows even less consistency. Individual growth curves for height and weight do not seem to cross a great deal from the age of six until after eleven for boys and until after nine for girls. During the earlier years of childhood when growth is more rapid and when environment influences weight so much, the curves tend to cross more frequently and, in the case of girls, again at ten, eleven, and twelve.

Forecasting Intellectual Development. Evidence has been cited (in Chapter XVIII) that knowledge of a child's height, weight, strength, ossification of bones, physiological age, or any other physical trait thus far carefully investigated does not enable the accurate prediction of his intellectual status. Estimating intelligence from physical status is not likely to be more than five per cent more accurate than guessing. We can, however, predict his intellectual status with considerable precision. We know (see Chapter IX) that Stanford-Binet intelligence examinations, repeated after six months, a year, or longer, yield I.Q.'s which are almost the same as those on the first examination, differing from them by a probable error of four or five points. If a child's I.Q. today on the Stanford-Binet test

⁴ See Shirley, *The First Two Years*, vol. 1.

(given under standard testing conditions) is 98, the chances are even that upon retesting him a year from now his I.Q. will be between 93 and 103. I.Q.'s from group intelligence tests tend to fluctuate more. With very young children accurate prediction is more difficult.⁵ Of course, if accident or disease intervenes and affects the child seriously, the mental test would not predict so accurately.

Predicting the Child's Scholastic Achievement in the Elementary School. The amount that a child will learn in school and how well he learns it are dependent upon at least two things, his ability at the time and the amount of effort he puts forth. Accordingly, accurate prediction depends upon reliable and valid measures of these two things. Much use has been made of mental tests, achievement tests, and various sorts of estimates by teachers in predicting a child's academic achievement in the elementary school. Many studies have been reported in which the correlation method and the grouping method of prediction have been used extensively. On the whole, the results indicate that a good intelligence test has considerable value in predicting the child's achievement in reading, numbers, history, geography, and the like. If pupils at the beginning of the first grade are ranked according to their scores on an intelligence test and then after a half-year are ranked according to their ability to read, their two ranks will be closely similar, but not identical. If we rank the pupils of a fifth grade at the beginning of the year according to their scores on a good intelligence test, and at the middle of the school year or in the spring rank them according to their achievement in reading, geography, history, or arithmetic, we also will find considerable agreement in ranks. The pupils ranking high on mental tests are likely to rank high on achievement in reading, arithmetic, etc.; the pupils not ranking so high on the one thing are not likely to rank so high on the other. Here also, however, the agreement in the two sets of ranks is far from perfect.

⁵ See Bayley, *Mental Growth during the First Three Years*; Furfey and Muehlenbein, in *Journal of Genetic Psychology*, vol. 40, pp. 219-223; Gesell, in *Archives of Neurology and Psychiatry*, vol. 22, pp. 522-529.

If the conditions of testing are good, each child is likely to have worked at a high level of effort while taking the intelligence test. Each child, however, is not likely to have worked at the same relatively high level of effort during the entire half year in which he studied the school subjects. Some children have been more interested than others in a given subject and have worked harder at it. Accordingly, the amounts of effort are not constant, but vary from child to child. This is a very important factor which lowers the correlation between the predictive test and scholastic achievement.

As a child progresses in school, the kind of work that he does during one half year or year has considerable value in predicting what he will do in the succeeding one, but there are numerous exceptions. Conditions which interfere with his doing good work may arise, or they may disappear and thus modify his subsequent achievement. On the whole, continuity and consistency are the rule, probably because the effectiveness of teaching does call out considerable effort on the part of most pupils and thus allows intelligence-test ability to play a dominant rôle in differentiating achievement.

So many things may affect the accuracy and validity of the scores on tests that care must be exercised to avoid errors. If a child's achievement in some school subject is not in accord with his mental test score, further investigation is needed. If he was worried, hurried, emotionally upset, or sick when he took the mental test, his score may be too low. Cases like this are found, cases in which the obtained I.Q.'s are several points lower than they really should be. If the child exerts insufficient effort in school, his achievement will not be in accord with his scores on the mental test. Again, accurate prediction is found to be dependent upon the constancy of conditions affecting the thing which is being forecast.

Mental test scores, achievement, and teachers' estimates of achievement and ability seem to be of most value in predicting the child's achievement in the more fundamental school subjects, such as reading and arithmetic. The applications of this predictive knowledge are discussed briefly in the following section of this chapter.

Predicting the Child's Social Development. Case studies and experimental investigations indicate some general continuity in the child's social development, provided the influences playing upon him do not change too much. Thus, the child at six who does not like to play with other children but prefers to be alone might continue this unfortunate tendency if the factors producing it continue to act upon him. But why should they be allowed to do so? The adults who bear the responsibility of directing or guiding his development surely should try to change the conditions and to induce the development of some other trait. Of course, if one is an extreme hereditarian and believes that heredity alone determines whether a child enjoys playing alone or with others, then the child's development along this line is predetermined. If this were true, there would seem to be little for parents or teachers to do about it. The evidence thus far indicates that training has much influence and that unsatisfactory social development can be modified within certain broad limits.

Predicting the Moral and Religious Development of Children. The child's moral character or his religious behavior cannot be foretold with accuracy. Hartshorne and May's⁶ tests of deception may be used to predict the behavior of a group but only "within the situations utilized" in the tests. The proportion of a group of children that will cheat can be predicted in advance, as well as their average deception scores. To predict what a given child would do, however, would require twice as many deception tests as they used. But even then, the results would not enable us to predict his honesty "in just any situation." The tests would have to be supplemented by others which would sample other sorts of situations involving honesty. The same is true for other traits of character. An enormous amount of work remains to be done before prediction of a child's morals will be accurate enough to be highly valid. Even the tests which we now possess have not been in use long enough to know how well we can prophesy the things they measure over a period of time—for example, two or three

⁶ *Studies in Deceit*, Book I, pp. 145-146.

years or longer. From observation, case studies, and certain *a priori* considerations, it seems that some traits of character, formed in early childhood, persist into later childhood and adolescence. The evidence concerning the effect of many environmental factors on moral qualities is uncertain, however, and the prevalent hypotheses are not of unquestioned validity. Even predicting delinquency is hazardous.

Predicting the child's religious development is even more uncertain. The usual course of religious development during childhood is known, but this permits the prediction of general tendencies only, and not of individual differences. Very few precise techniques of measurement have been introduced in this field.

2. THE GUIDANCE AND CONTROL OF CHILDREN

The Relationship Between Prediction and Control. Parents, teachers, and other persons who have many contacts with children should be well informed concerning the predictive facts of child psychology. Only through an intelligent and discriminating use of sound information can they guide child behavior most effectively. The general principles governing desirable development are perhaps of greatest value to practical persons. If it is known that, in general, certain procedures usually lead to worthwhile outcomes, these methods will be employed. In this way, prediction is used for positive guidance. Although it is important for the student to know something of the degree of precision with which traits may be forecast, the parent and teacher do not employ coefficients of correlation or probable errors directly. They want to know the reliable facts concerning the more general tendencies of child development.

Doubt is sometimes expressed as to the value of predicting *undesirable* characteristics of behavior, such as delinquency or school failure. In fact, it has been deemed pernicious to try to predict in advance any behavior or development which is greatly subject to modification by environment and which, in

the interests of the individual and society, probably should be modified. At best, such prediction can only tell what is likely to happen if certain forces continue to influence the child's development. The child's traits of personality and character are much influenced by environment and training. Accordingly, parents, teachers, and others interested in his welfare will try to alter the conditions surrounding him whenever they find some undesirable trait making its appearance, or whenever some desirable trait fails to develop. It is of some value to know that a given set of traits or tendencies are likely to lead to delinquency or to some other undesirable development, unless modified. Then, if we do not desire that result, we can alter the conditions so as to secure a more desirable one. In making predictions of this type, we must be cautious about giving prediction a meaning which presupposes a constancy or consistency of development independent of changes in environment. An unfavorable prediction need not be regarded as inevitable. We can often manipulate the environment to *prevent* our prediction from becoming true. This is the fundamental value which prediction has for the guidance and control of child behavior.

General Principles of Child Training. Many specific facts and principles underlie effective and desirable child training, which have been discussed throughout this book. Some of the most important general principles may be summarized in seven divisions or groups. Child care that is in accord with the pertinent generalizations included under these statements is likely to be effective and constructive for the child and satisfying to the adult who guides him.

(1) *Control largely through guidance.* It seems evident that child behavior is best controlled by guiding or directing it. This is not the easiest way for parent or teacher to train the child. It would be much simpler and easier to establish strict rules and to enforce them rigidly. The parent or teacher then would become a sort of policeman and would compel the child's compliance with the rules and regulations he had set up. Under such a system, however, the child's part is merely passive

obedience to the rules laid down and enforced by someone else. He would learn little of self-control and self-direction. A primary purpose of all training, care, and control is to help the child develop independent self-direction and self-control which are exercised for his own good and for the social good. The child must grow up and take his own place in society. He cannot always have someone to direct his affairs and have charge of his behavior. That responsibility in time should rest upon his shoulders. He will be far more effective and much happier if he is trained during childhood in increasing degree to direct his own behavior. In this way he learns by actual practice to be self-reliant, independent, and self-controlled. In fact, as he gets older he should need little control of many features of behavior. Even less actual guidance should be necessary as he passes to later adolescence. During childhood he will need more; in early childhood, a great deal more. It would seem highly desirable that guidance and control be largely a cooperative affair in which the child and his parents or teachers work together in attaining socially and individually desirable ends.

(2) *Discipline necessary in child training.* The child today lives under very complex conditions, far removed from the simple life of primitive man. His drives and urges and his expanding but meager knowledge are not sufficient to adapt him to the conditions under which he lives. If left to his own devices, it would take an enormously long time for him to adapt himself to civilized life. A single lifetime would be far too short, as one realizes when he traces the development of any one of the major institutions, inventions, laws, or ethical principles of the present day. He does not have time for unaided trial-and-error experimentation out of which to develop a modern system of transportation. He cannot profitably be allowed to evolve unaided an ethical system, for it takes too long. He cannot live through the entire history of language and develop a language of his own without help from adults. Neither would it be wise to allow him to develop an accurate method of measuring time or space. An almost infinite amount of experience, labor, and thought is represented by a single pattern of culture

of modern life. The best results are likely to be obtained when each new generation builds upon the experiences of the generations that have lived before. The culture of the race represents a vast store of experience, struggle, and wisdom. Those in charge of the child's training have the task of making this available to him in the most effective way. In his immaturity he does not know in what direction to bend his efforts. To the adults of one generation is given the perennial task of training the oncoming generation in the things and ways that are likely to prove most valuable to it. Discipline should not be arbitrary, however. The principle of control through guidance and the discussion of motivation and interest (Chapter XII) indicate that those procedures are likely to be most effective which allow the child much initiative, freedom of choice, and considerable play for his interests.

The doctrine that we should never thwart or repress the child, that he should be allowed to develop as he sees fit without discipline or hindrance from his elders, needs to be taken with a few grains of salt. It seems a wiser policy to guide and direct his behavior along generally desirable lines, but within these limits, to allow much play for his initiative and much freedom of action. Thwarting or conflict of desires not only is unavoidable, but often is for the common good as well as for that of the individual. As we have pointed out elsewhere,⁷ undisciplined impulses are a common cause of emotional disturbances or maladjustments at adolescence. It seems highly desirable that the child's impulses be disciplined as he goes through childhood, and that, in as large measure as possible, the discipline come from within. Here again, wise guidance arranges the conditions so that parent and teacher cooperate with the child so that he secures that form of discipline that he needs most. The two extremes, rigid and fixed outside control or no control, seem equally undesirable. Wise guidance accomplishes the desired results in ways that tend to develop in increasing degree the child's independence, dependability, and self-control.

⁷ *Psychology of Adolescence*, p. 238.

(3) *Reward, substitution, and punishment.* What use does effective child training make of reward, substitution, and punishment? Child care and training consists chiefly of habit formation. It seeks (1) to secure effective desirable responses, (2) to prevent or eliminate ineffective undesirable ones, and to train the child so that he will (3) tend of his own accord to make the former and avoid the latter, and (4) find much satisfaction in so doing. Accordingly, reward, substitution, and punishment are means by which these purposes are to be attained. As we have already seen in the description of children's learning, one of the best ways of securing a given response is to arrange the conditions so that making that response is satisfying, and not making it (that is, making some other response in its stead) is annoying. The most effective way of preventing or eliminating an undesirable response is to substitute a desirable one in its place, to make it satisfying, and to make the undesirable one annoying. Thus reward and substitution seem to be the most effective means of securing desirable behavior. Undesirable behavior may be prevented, however, by using some form of punishment which connects dissatisfaction with the undesired behavior. Punishment as a means of controlling child behavior has one serious limitation not characteristic of reward and substitution. It forces the child to do something without his own inner consent, for extraneous reasons. As he gets older, the extraneous element may become more noticeable. He may regard the punishment as something inflicted because of caprice, authority, and superior strength of those inflicting it, especially if the punishment be ill-advised and hasty and is inflicted in anger or in a vindictive manner.⁸ Reward and substitution seem preferable, on the whole, because they utilize the child's interests and other positive factors. Of course, punishment may be necessary from time to time both at home and at school. It should then be appropriate to the occasion and to the child. He should understand why it is be-

⁸ For experimental work on the influence of reward and reproof upon the effectiveness of relatively simple performance see Anderson and Smith, in *Journal of Experimental Education*, vol. 2, pp. 138-160; Chase, *Motivation of Young Children*, and the bibliography given by Chase.

ing given, and those inflicting it should be free from anger and not use it as an emotional outlet.

(4) *The use of the child's interests.* Child care and training will be far more effective if the child's interests and spontaneous activities are utilized. The importance of interests and motives has been discussed at length in Chapter XII. Parents and teachers dare not overlook or fail to use this powerful ally in their work with children. In school work modern educational theory and practice make interest a fundamental criterion for evaluating curriculum materials, teaching procedures, and pupil control.

(5) *Adjusting control to individual needs.* Children of the same age, sex, socio-economic status, intelligence, and family differ enormously in other respects. Brothers or sisters also differ very much, as parents and other observers well know. Accordingly, effective guidance and control must take these differences into account. Two essentials in adapting guidance and control to the needs of each child are to find out exactly what those needs are and then to devise procedures for meeting them. At any given time parent or teacher may use the following procedures to advantage: (1) He may make out an extensive list of specific traits, habits, etc., which he believes should be developed in the child. (2) Next he may rate or appraise the child on each one of them to see if suitable progress is being made and to discover any weak points. (3) He may analyze the child's deficiencies to ascertain what sort of training or treatment is likely to be effective. The second step may be merely an inventory of specific answers to the question, "What are the unsatisfactory developmental trends in this child?" The use of a more complete list of traits is likely to be more specific and to reveal the child's standing on significant traits other than his weakest ones. It insures an all-round survey of his developmental status. We have reason for believing that positive active diagnosis and remedial treatment of deficiencies in the all-inclusive fields of personality and character will yield valuable returns similar to those found in the more limited fields of instruction in reading, arithmetic,

spelling, or penmanship. Waiting until the child shows some very marked aberration in behavior is less effective than the positive anticipation and elimination of it before it has time to develop very much. It seems highly desirable that child guidance and control at home and at school make frequent appraisals and then seek to provide the needed treatment indicated by the diagnosis.

(6) *Sympathetic, firm, even, just, and rational treatment.* The guidance or control of child behavior should be sympathetic, firm, even, just, and rational, if it is to be most effective. The child in his immaturity and inexperience needs sympathetic treatment but not sentimental coddling or spoiling. His problems are as real and important to him as are the adults' problems to them. Child and parent should have a sympathetic understanding which comes from intimate association together. Harsh, cruel treatment has no place in guiding and directing the child's development, but guidance and control should be firm, not easy-going and lax. Control that is firm tends to hold the child steady and help him attain self-control. Control also should be even or consistent, and not marked by erratic variations dependent upon the mood of parent or teacher. This is a hard criterion to fulfill. We once visited an eighth-grade class whose teacher had difficulty in controlling her pupils. Her physical condition, mood, or emotional status at the moment was reflected directly in her classroom control. Pupils knew by the way she felt whether she would be strict or lenient. As we came past the door of her classroom just after school began one rainy morning, a boy coming from her room greeted another boy who was tardy and was just ready to enter her room by saying, "It's a fine day today," without any note of sarcasm. To this the other boy said, "So?" and entered the room with a swagger, swinging his books vigorously from the end of a strap around them. Inquiry revealed that the pupils in this room had this expression, "It's a fine day today," to indicate that the teacher would be easy-going at that time.

Just treatment is the right of every child. It is the least

that parents or teachers should give them. Injustice rankles even with small children. If justice is the high virtue we usually acclaim it, then the child should become accustomed to it from earliest infancy. He should never suffer from unfair treatment at the hands of those who have charge of his care and control. Finally, control should be rational, if we hope to train children to be rational beings themselves.

(7) *Developing an objective attitude.* The objective attitude means looking at ourselves and our behavior as others do who know us and observe us. It implies a criterion of judging and evaluating which is free from prejudice, bias, or favorable or unfavorable emotional attitude. The objective attitude is characterized by an impartial dispassionate regard for accurate unbiased judgments and appraisals and is not different from the scientific attitude. Men usually develop it in connection with their business or professional affairs, because their success is dependent in part upon viewing matters as unbiased observers would. Accurate and sound judgment requires the individual to look at essential facts and weigh them as they are, rather than as he would like them to be.

The child does not have an objective attitude by natural endowment, but has to develop it through his experiences. It is extremely important that children be guided into a fair and unprejudiced evaluation of the world. At birth, the infant is egocentric, and he continues to be for some time thereafter. The first step in training objectivity in a child is for him to develop many wholesome interests outside of himself. He will be much happier and will avoid many needless emotional conflicts if he keeps his attention, interest, and effort upon various objective activities and projects. The kinds of motivation used by parents and teachers have an important influence upon him. Fear should have no place, as we have shown in Chapter XI, neither should ridicule, nor encouraging the child to show off. Various forms of intimidation besides fear hinder developing the objective attitude in the child. Keeping the child engaged upon interesting activities with other children is effective in building up the objective attitude.

An important factor in developing objectivity in a child, and a matter of great general significance in child training, is the maintenance of an objective attitude *toward* the child by parents and teachers. The best success as a teacher or a parent depends also upon being able to view the behavior of one's pupils or children in an unbiased or objective manner. Teachers usually are better able to do this than are parents, chiefly because they have more practice. Their training and experience help them build up a professional attitude toward their work, and they do not have the strong emotional attachment many parents have from so much care and watching of the child from early infancy. Usually there is much emotional difference between "my pupil," and "my son." Accordingly, parents have the more difficult task in developing an objective attitude toward their child. They find it very difficult to keep their feelings in the background when judging their child's behavior, and their emotions warp their judgment. Investigation⁹ has shown that parents give higher ratings to their children's desirable qualities than do acquaintances who observed them. The parent has watched solicitously, through sickness and health, the growth and development of his child from early infancy. He realizes the child's immaturity and sees clearly the enormous gap between the innocent, trusting, frank, playful, little fellow, his son, and the mature adult. He excuses the child because of his helplessness in meeting adults' demands. He sees the boy as *his son*, not as a little fellow of four years who has some undesirable trait. If the undesirable quality is very marked, he may try to overlook it himself and to have others overlook it. All of this is perfectly natural, but it is not for the child's best interests.

Men in business have learned by experience not to spend any time wishing for a thing to be done, but rather to give their entire attention to a cold, dispassionate study of the matter, and of the best ways to bring it to a successful conclusion. In similar manner, it would seem highly desirable that parents from

⁹ See Laws, *Parent-Child Relationships: A Study of the Attitudes and Practices of Parents Concerning Social Adjustment of Children*.

time to time critically evaluate the child's behavior and personality traits in an objective manner. If they can keep uppermost in mind, "What is the best thing for the child?" and temporarily not think of him as "my child," "my darling boy," or "my sweet little one," then they are more likely to form correct appraisals of his conduct and qualities of personality. A danger in the subjective attitude is that parents may foster the child's dependence and helplessness by it. Companionship, mutual understanding, sympathy, and cooperation between parents and child are very desirable; but, like many other good things, can be overdone. If they exclude normal companionship with other children and keep the parents too solicitous of their child and his welfare, they are not serving either the parents' or the child's own best interests. Often we find maladjustments in parents which make it very hard for them to develop an objective attitude toward their children. If the parent is dissatisfied with his own success and has strong feelings of inferiority, he may compensate by trying to have his child excel. Even in his strong disappointment over his child's lack of ability, he may urge the child on, forcing him to do long hours of work, and even resorting to bitter scolding and denunciation when the child fails. Many cases like this are found in school. The parent is using his child as an emotional outlet for himself and really is very unjust and cruel.

Teachers are not entirely immune from the subjective attitude in making appraisals of their pupils' achievement and conduct. Courtis¹⁰ has shown that boys in the elementary grades "must develop greater ability than a girl to receive the same mark." For example, boys who made the same scores on a comprehensive test in arithmetic, reading, etc., as did the girls were given lower marks. Or, when two groups of boys and girls who had the same school marks in reading, arithmetic, geography, history, etc., were studied, the boys' achievement in these subjects (as measured objectively) was from 10 to more than 100 per cent greater than that of girls. Either the teachers' estimates had some subjective element in them or they were

¹⁰ *Why Children Succeed*.

based on things other than achievement. The greater tendency of boys, especially in the upper elementary grades, to self-assertion and non-conformity may have been a factor. Personal likes and dislikes should have no influence in appraising the child's achievement, character, and personality. His actual degree of honesty, for example, is a fact which is not to be overestimated or underestimated by reason of our liking or not liking him.

Many habits, attitudes, and elements of knowledge are essential for the effective guidance of child behavior. Perhaps the most important of these, and one which can be fostered by reading and study, is the general habit of regarding children's behavior impartially, objectively, and scientifically. Of almost equal importance, however, is knowledge of the vast possibilities of development which lie before the child.

SELECTED REFERENCES

In addition to the references at the end of Chapters X-XIV, XVI, and XVII, the following ones give valuable suggestions on the guidance and control of children: Adler, *The Education of Children*, chaps. 2-7, 10, 11; Blanchard, *The Child and Society*, chaps. 2, 4; Blatz, in *Handbook of Child Psychology* (revised edition, edited by Murchison), chap. 18 (physiological drives or appetites, their rhythm, modifications, and maladjustments); Foster and Anderson, *The Young Child and His Parents* (case studies of 100 children, 2 to 7 years of age); Groves and Groves, *Wholesome Childhood: Mateer, Just Normal Children* (sleep, eating, laziness, instability, backwardness, fears, lies, running away, play difficulties, and many other everyday problems of normal children); Sayles, *The Problem Child at Home*, Parts I, II, III (emotional satisfactions which parents and children seek in one another, difficulties in parent-child relationships, and several illustrative case studies); Sayles and Nudd, *The Problem Child at School*, Thom, *Everyday Problems of the Everyday Child* (problems of everyday life such as parent-child relationships, sleep, feeding, thumb-sucking, anger, fear, jealousy, inferiority, delinquency, sex, teacher and pupil); Wickes, *The Inner World of Childhood*, chaps. 2, 3, 8, 9 (following Jung, the influence of parental difficulties upon the Unconscious of the child, early relationships, fear, sex, etc.). Parents, teachers, and other adults should read Frankwood Williams's discussion of "Idealistic but Infected Homes" and "Innocent but Dangerous Parents" in his *Adolescence* (Studies in Mental Hygiene), section I, chaps. 2 and 3.

See also references at the end of this volume.

ADDITIONAL REFERENCES

The following references are supplementary to those given at the end of the chapters and in footnote citations throughout the volume.

CHAPTER I

- Anderson, J. E., *et al.*, *A Handbook of Child Psychology* (revised edition, edited by Murchison). Worcester, Mass., Clark University Press, 1933. 956 pp. Especially chap. 1.
- Anderson, J. E., and Goodenough, F. L., *The Modern Baby Book*. New York, Norton, 1929. 48 pp.
- Bridges, K. M. B., *The Social and Emotional Development of the Pre-School Child*. London, Kegan Paul, Trench, Trubner, and Company, Ltd, 1931. 277 pp.
- Brooks, F. D., "Criteria of Educational Research," *School and Society*, vol. 18 (1923), pp 724-729.
- Dearborn, G. V. N., *Moto-Sensory Development: Observations on the First Three Years of Childhood*. Baltimore, Warwick and York, 1910. 215 pp.
- Gesell, A., *The Mental Growth of the Pre-School Child*. New York, Macmillan, 1925. 447 pp
- Hall, W. S., "The First 500 Days of a Child's Life", *Child Study Monthly*, vol. 2 (1896-1897), pp. 330-342, 394-407, 458-473, 522-537, 586-608.
- Hollingworth, H. L., *Judging Human Character*. New York, Appleton, 1922. 268 pp.
- McCarthy, D. A., *The Language Development of the Preschool Child*. Minneapolis, University of Minnesota Press, 1930. 174 pp.
- Olson, W. C., *The Measurement of Nervous Habits in Normal Children*. Minneapolis, University of Minnesota Press, 1929. 97 pp.
- Piaget, J., *Judgment and Reasoning in the Child*. New York, Harcourt, Brace, 1928. 260 pp.
- Piaget, J., *The Language and Thought of the Child*. New York, Harcourt, Brace, 1926. 246 pp.
- Preyer, W., *The Mind of the Child*. 1. *The Senses and the Will*; 2. *The Development of the Intellect*. New York, Appleton, 1888, 1889. 346, 317 pp.
- Richards, T. W., and Irwin, O. C., "Experimental Methods Used in Studies on Infant Reactions Since 1900", *Psychological Bulletin*, vol. 31 (1934), pp. 23-46.
- Shinn, M., *Biography of a Baby*. Boston, Houghton Mifflin, 1900. 247 pp.
- Stoddard, G. D., and Wellman, B. L., *Child Psychology*. New York, Macmillan, 1934. 419 pp.
- Thomas, D. S., *et al.*, *Some New Techniques for Studying Social Behavior*. New York, Teachers College, Columbia University, 1929. 203 pp.
- Webb, E., "Character and Intelligence"; *British Journal of Psychology Monograph Supplements*, no. 3, 1915. 99 pp.

- Weiss, A. P., "The Measurement of Infant Behavior"; in *Psychological Review*, vol. 36 (1929), pp. 453-471.
- Woolley, H. T., "Agnes: A Dominant Personality in the Making"; *Pedagogical Seminary*, vol. 32 (1925), pp. 569-598.

CHAPTER II

- Bridges, C. P., "The Bar 'Gene' a Duplication"; *Science*, vol. 83 (1936), pp. 210-211.
- Carmichael, L., "Origin and Prenatal Growth of Behavior", in Chapter 2, *Handbook of Child Psychology* (revised edition, edited by Murchison). Worcester, Mass., Clark University Press, 1933. 956 pp.
- Coghill, G. E., "Individuation versus Integration in the Development of Behavior"; *Journal of General Psychology*, vol. 3 (1930), pp. 431-435.
- Coghill, G. E., "The Early Development of Behavior in the Amblystoma and in Man"; *Archives of Neurology and Psychiatry*, vol. 21 (1929), pp. 989-1009.
- Coghill, G. E., "The Genetic Interrelation of Instinctive Behavior and Reflexes"; *Psychological Review*, vol. 37 (1930), pp. 264-266.
- Coghill, G. E., "The Structural Basis of the Integration of Behavior"; *Proceedings National Academy of Sciences*, vol. 16 (1930), pp. 637-643.
- Holt, E. B., *Animal Drive and the Learning Process*. New York, Holt, 1931 307 pp.
- Jordan, H. E., and Kindred, J. E., *A Textbook of Embryology*. New York, Appleton, 1926. 613 pp.
- Keith, A., *Human Embryology and Morphology*. London, Arnold, 1923. 491 pp.
- Minkowski, M., "Sur les mouvements, les réflexes, et les réactions musculaires du fœtus humain de 2 à 5 mois et leur relations avec le système nerveux fœtal"; *Revue Neurologique*, vol. 37 (1921), pp. 1105-1118, 1235-1250.
- Morgan, T. H., *The Theory of the Gene*. New Haven, Yale University Press, 1928. 343 pp.
- Morris, H., *Human Anatomy* (Edited by C. M. Jackson.) Philadelphia, Blakiston's, 1933 1481 pp.
- Pratt, K. C., Nelson, A. K., and Sun, K. H., *The Behavior of the Newborn Infant*. Columbus, Ohio State University Press, 1930. 237 pp.
- Schultz, A. H., "Fetal Growth in Man"; *American Journal of Physical Anthropology*, vol. 6 (1923), pp. 389-399.
- Streeter, G. L., "The Development of the Egg as Seen by the Embryologist"; *Scientific Monthly*, vol. 32 (1931), pp. 495-506.

CHAPTER III

- Adams, D. K., "A Restatement of the Problem of Learning"; *British Journal of Psychology* (General Section), vol. 22 (1931-32), pp. 150-178.
- Banister, H., et al., *A Handbook of General Experimental Psychology* (ed. by Murchison). Worcester, Mass., Clark University Press, 1934. 1125 pp.

- Blanton, S., and Blanton, M. G., *Child Guidance*. New York, Century, 1927. 301 pp.
- Boring, E. G., Langfeld, H. S., Weld, H. P., et al., *Psychology, A Factual Text-book*. New York, Wiley, 1935. 555 pp.
- Goodenough, F. L., *Developmental Psychology*. New York, Appleton-Century, 1934. 619 pp.
- Heidbreder, E. F., "Problem Solving in Children and Adults"; *Pedagogical Seminary*, vol. 35 (1928), pp. 522-545.
- Hilgard, J. R., "Learning and Maturation in Preschool Children"; *Journal of Genetic Psychology*, vol. 41 (1932), pp. 35-56.
- Hunter, W. S., *Human Behavior* (revised). Chicago, University of Chicago Press, 1928. 355 pp.
- Hurlock, E. B., "The Value of Praise and Reproof as Incentives for Children"; *Archives of Psychology*, vol. 11, no. 71 (1924-1925), 78 pp.
- McGeoch, J. A., "Forgetting and the Law of Disuse"; *Psychological Review*, vol. 29 (1932), pp. 352-370.
- Mateer, F., *Child Behavior, A Critical and Experimental Study of Young Children by the Method of Conditioned Reflexes*. Boston, Badger, 1918. 239 pp.
- Matheson, E., "A Study of Problem Solving Behavior in Preschool Children"; *Child Development*, vol. 2 (1931), pp. 242-262.
- Mattson, M. L., "The Relation Between the Complexity of the Habit to be Acquired and the Form of the Learning Curve in Young Children"; *Genetic Psychology Monographs*, vol. 13 (1933), pp. 299-398.
- National Society for the Study of Education, "Educational Diagnosis." *Thirty-Fourth Yearbook*. Bloomington, Ill., Public School Publishing Company, 1935. 563 pp.
- Pyles, M. K., "Verbalization as a Factor in Learning"; *Child Development*, vol. 3 (1932), pp. 108-113.
- Razran, G. H. S., "Conditioned Responses in Children"; *Archives of Psychology*, 1933, no. 148. 120 pp.
- Roberts, K. E., *Learning in Preschool and Orphanage Children: An Experimental Study of Ability to Solve Different Situations According to the Same Plan*. Iowa City, University of Iowa, 1933. 94 pp.
- Thorndike et al., *Comparative Psychology* (edited by Moss). New York, Prentice-Hall, 1934. 529 pp.
- Wendt, G. R., "An Interpretation of Inhibition of Conditioned Reflexes as Competition Between Reaction Systems"; *Psychological Review*, vol. 43, (1936), pp. 258-281.
- Wenger, M. A., "An Investigation of Conditioned Responses in Human Infants"; pp. 9-90 of *Studies in Infant Behavior*, vol. 3, by Wenger, M. A., et al. Iowa City, University of Iowa, 1936. 207 pp.

CHAPTER IV

- Dennis, W., "A Description and Classification of the Responses of the New-born Infant"; *Psychological Bulletin*, vol. 31 (1934), pp. 5-22.
- Feldman, W. M., "Nature of Plantar Reflex in Early Life and the Cause of

- Its Variations"; *American Journal of Diseases of Children*, vol. 23 (1922), pp. 1-40.
- Furfey, P. H., Bonham, M. A., and Sargent, M. K., "The Mental Organization of the Newborn"; *Child Development*, vol. 1 (1930), pp. 48-51.
- Haller, M. W., "The Reactions of Infants to Changes in the Intensity and Pitch of Pure Tones"; *Journal of Genetic Psychology*, vol. 40 (1932), pp. 162-180.
- Irwin, O. C., "The Amount of Motility of Seventy-Three Newborn Infants"; *Journal of Comparative Psychology*, vol. 14 (1932), pp. 415-428.
- Irwin, O. C., "The Latent Time of Body Startle in Infants"; *Child Development*, vol. 3 (1932), pp. 104-107.
- Irwin, O. C., "The Organismic Hypothesis and Differentiation of Behavior", *Psychological Review*, vol. 39 (1932), pp. 128-146, 189-202, 387-393.
- Irwin, O. C., "Proximodistal Differentiation of Limbs in Young Organisms"; *Psychological Review*, vol. 40 (1933), pp. 467-477.
- Jensen, K., "Differential Reactions to Taste and Temperature Stimuli in Newborn Infants"; *Genetic Psychology Monographs*, vol. 12 (1932), pp. 361-479.
- Mohr, G. J., and Bartelme, P., "Mental and Physical Development of Children Prematurely Born"; *American Journal of Diseases of Children*, vol. 40 (1930), pp. 1000-1015.
- Pavlov, I. P., *Conditioned Reflexes*. London, Oxford University Press, 1927. 430 pp.
- Ray, W. S., "A Preliminary Report on a Study of Fetal Conditioning"; *Child Development*, vol. 3 (1932), pp. 175-177.
- Richards, T. W., and Irwin, O. C., *Plantar Responses in Infants and Young Children*. Iowa City, University of Iowa, 1934. 146 pp.
- Richardson, H. M., "The Growth of Adaptive Behavior in Infants: An Experimental Study at Seven Age Levels"; *Genetic Psychology Monographs*, vol. 12 (1932), pp. 195-359.
- Shirley, M. M., *The First Two Years*: vol. 1, *Postural and Locomotor Development*; vol. 2, *Intellectual Development*. Minneapolis, University of Minnesota Press, 1931, 1933. 221, 513 pp.
- Stoddard, G. D., and Wellman, B. L., *Child Psychology*. New York, Macmillan, 1934. 419 pp.
- Stubbs, E. M., "The Effect of the Factors of Duration, Intensity and Pitch of Sound Stimuli on the Responses of Newborn Infants"; in Irwin *et al.*, *Studies in Infant Behavior*. Iowa City, University of Iowa Studies in Child Welfare, vol. 9, no. 4 (1934).
- Weiss, L. A., "Differential Variations in the Amount of Activity of Newborn Infants under Continuous Light and Sound Stimulation"; in Irwin *et al.*, *Studies in Infant Behavior*. Iowa City, University of Iowa Studies in Child Welfare, vol. 9, no. 4 (1934).

CHAPTER V

- Benedict, F. G., and Talbot, F. B., *Metabolism and Growth from Birth to Puberty*. Washington, D C., Carnegie Institution, 1921. 213 pp.
- Boyd, E., "The Weight of the Thymus Gland in Health and in Disease", *American Journal of Diseases of Children*, vol. 43 (1932), Part I, pp. 1162-1214.
- Boynton, B., *The Physical Growth of Girls*. Iowa City, University of Iowa, 1936. 105 pp.
- Brooks, F. D., *Psychology of Adolescence*. Boston, Houghton Mifflin, 1929. 652 pp.
- Cattell, P., *Dentition as a Measure of Maturity*. Cambridge, Mass., Harvard University Press, 1928. 91 pp.
- Ellis, R. S., "Norms for Some Structural Changes in the Human Cerebellum from Birth to Old Age"; *Journal of Comparative Neurology*, vol. 32 (1920), pp. 1-34.
- Gray, H., and Ayres, J. G., *Growth in Private School Children*. Chicago, University of Chicago Press, 1931. 282 pp.
- Iowa Child Welfare Research Station: "Physical Traits of Young Children"; *American Journal of Diseases of Children*, vol. 38 (1929), pp. 541-546.
- Iowa Child Welfare Research Station: "Physical Traits in Iowa Infants"; *American Journal of Diseases of Children*, vol. 42 (1931), pp. 1137-1143.
- Meredith, H. V., *The Rhythm of Physical Growth*. Iowa City, University of Iowa, 1935. 128 pp.
- Murlin, J. R., "Physiology of Metabolism in Infancy and Childhood"; *Pediatrics*, vol. 1, pp. 520-846. Philadelphia, Saunders, 1923.
- Pyle, S. I., and Drain, C. L., "Some Conditions in the Dentition of Pre-school Children", *Child Development*, vol. 2 (1931), pp. 147-152.
- Richey, H. G., "The Blood Pressure in Boys and Girls before and after Puberty"; *American Journal of Diseases of Children*, vol. 42 (1931), pp. 1281-1330.
- Rose, M. S., et al., "Iron Requirements in Early Childhood"; *Journal of Nutrition*, vol. 3 (1930), pp. 229-235.
- Scammon, R. E., and Calkins, L. A., *The Development and Growth of the External Dimensions of the Human Body in the Fetal Period*. Minneapolis, University of Minnesota Press, 1929. 367 pp.
- Van Dyke, G. E., "The Effect of the Advent of Puberty on the Growth in Height and Weight of Girls"; *School Review*, vol. 38 (1930), pp. 211-221.
- Wallis, R. S., "Relative Growth of the Extremities from Two to Eighteen Years of Age"; *American Journal of Physical Anthropology*, vol. 16 (1931), pp. 171-191.
- Wilson, C. A., et al., *The Merrill-Palmer Standards of Physical and Mental Growth*, Detroit, Merrill-Palmer School, 1930. 121 pp.
- Wissler, C., "Sex Differences in Growth of the Head"; *School and Society*, vol. 25 (1927), pp. 143-146.
- Woodbury, R. M., *Statures and Weights of Children under Six Years of Age*.

U.S. Department of Labor, Children's Bureau, Publication no. 87, Washington, D.C., Government Printing Office, 1921. 117 pp.

CHAPTER VI

- Bryan, E. S., "Variations in the Responses of Infants During the First Ten Days of Post-Natal Life"; *Child Development*, vol. 1 (1930), pp. 56-77.
- Castner, B. M., "The Development of Fine Prehension in Infancy"; *Genetic Psychology Monographs*, vol. 12 (1932), pp. 105-193.
- Chapman, J. C., "Statistical Considerations in Interpreting the Effect of Training on Individual Differences"; *Psychological Review*, vol. 32 (1925), pp. 224-234.
- Gates, A. I., "The Nature and Limit of Improvement from Training"; in *Twenty-Seventh Yearbook of the National Society for the Study of Education*, Part 1. Bloomington, Ill., Public School Publishing Company, 1928, pp. 441-460.
- Gesell, A., and Halverson, H. M., "The Development of Thumb Opposition in the Human Infant"; *Journal of Genetic Psychology*, vol. 48 (1936), pp. 339-361.
- Gesell, A., and Thompson, H., "Learning and Growth in Identical Infant Twins"; *Genetic Psychology Monographs*, vol. 6 (1929), pp. 1-124.
- Goodenough, F. L., and Brian, C. R., "Certain Factors Underlying the Acquisition of Motor Skills by Preschool Children"; *Journal of Experimental Psychology*, vol. 12 (1929), pp. 127-155.
- Halverson, H. M., "An Experimental Study of Prehension in Infants by Means of Systematic Cinema Records"; *Genetic Psychology Monographs*, vol. 10 (1931), pp. 107-286.
- Hicks, J. A., *The Acquisition of Motor Skill in Young Children*. Iowa City, University of Iowa, 1930. 80 pp.
- Jersild, A. T., *Training and Growth in the Development of Children*. New York, Teachers College, Columbia University, 1932. 73 pp.
- McGinnis, E., "The Acquisition and Interference of Motor Habits in Young Children"; *Genetic Psychology Monographs*, vol. 6 (1929), pp. 209-311.
- Mead, C. D., *The Relation of General Intelligence to Certain Mental and Physical Traits*. New York, Teachers College, Columbia University, 1916. 117 pp.
- Pyle, W. H., *The Examination of School Children*. New York, Macmillan, 1913. 70 pp.
- Shepard, J. E., and Breed, F. S., "Maturation and Use in the Development of an Instinct"; *Journal of Animal Behavior*, vol. 3 (1913), pp. 274-285.
- Shinn, M. W., "Notes on the Development of a Child: I"; *University of California Publications of Education*, vol. 1 (1893), pp. 1-178, vol. 1 (1899), pp. 179-424.
- Smith, M. E., Lecker, G., Dunlap, J. W., and Cureton, E. E., "The Effects of Race, Sex, and Environment on the Age at which Children Walk"; *Journal of Genetic Psychology*, vol. 38 (1930), pp. 489-498.
- Smith, S., "Influence of Illness During the First Two Years on Infant Development"; *Journal of Genetic Psychology*, vol. 39 (1931), pp. 284-287.

- Spalding, D. A., "Instinct and Acquisition"; *Nature*, vol. 12 (1875), p. 507.
- Terman, L. M., *Genetic Studies of Genius*, vol. 1. Stanford University, Calif., Stanford University Press, 1925. 648 pp.
- Wellman, B. L., *The Development of Motor Coordination in Young Children*. Iowa City, University of Iowa, 1925. 93 pp.

CHAPTER VII

- Barnes, W., "Language as Behavior"; *Elementary English Review*, vol. 7 (1930), pp. 241-245; vol. 8 (1931), pp. 14-17, 24, 44-46, 48.
- Brooks, F. D., *The Applied Psychology of Reading*. New York, Appleton, 1926. 278 pp.
- Davis, E. A., "The Form and Functions of Children's Questions"; *Child Development*, vol. 3 (1932), pp. 57-74.
- Drever, J., "A Study of Children's Vocabularies"; *Journal of Experimental Pedagogy*, vol. 3 (1915-16), pp. 34-43, 96-103, 182-188.
- Faulke, K., and Stinchfield, S. M., "The Speech Development of Four Infants Under Two Years of Age"; *Journal of Genetic Psychology*, vol. 36 (1929), pp. 140-171.
- Fletcher, J. M., *The Problem of Stuttering*. New York, Longmans, Green, 1928. 362 pp.
- Gesell, A., *Infancy and Human Growth*. New York, Macmillan, 1928. 418 pp.
- Haggerty, L. C. G., "What a Two-and-a-Half-Year-Old Child Said in One Day"; *Journal of Genetic Psychology*, vol. 38 (1930), pp. 75-100.
- Head, H., *Aphasia and Kindred Disorders of Speech*. (2 vols.) Cambridge, Cambridge University Press, 1926. 549, 426 pp.
- International Kindergarten Union, *A Study of the Vocabulary of Children Before Entering the First Grade*. Baltimore, Williams and Wilkins, 1928. 36 pp.
- La Brant, L. L., "A Study of Certain Language Developments of Children in Grades Four to Twelve, Inclusive"; *Genetic Psychology Monographs*, vol. 14 (1933), pp. 387-491.
- Markey, J. K., *The Symbolic Process*. New York, Harcourt, Brace, 1928. 142 pp.
- McCarthy, D. A., "The Vocalizations of Infants"; *Psychological Bulletin*, vol. 26 (1929), pp. 625-651.
- Monroe, M., *Children Who Cannot Read*. Chicago, University of Chicago Press, 1932. 205 pp.
- Nice, M. M., "Length of Sentences as a Criterion of a Child's Progress in Speech"; *Journal of Educational Psychology*, vol. 16 (1925), pp. 370-379.
- Paget, R., *Human Speech*. New York, Harcourt, Brace, 1930. 360 pp.
- Pillsbury, W. B., and Meader, C. L., *The Psychology of Language*. New York, Appleton, 1928. 306 pp.
- Powers, F. F., "Psychology of Language Learning"; *Psychological Bulletin*, vol. 26 (1929), pp. 261-274.

- Pyles, M. K., "Verbalization as a Factor in Learning"; *Child Development*, vol. 3 (1932), pp. 108-113.
- Smith, M. E., *An Investigation of the Development of the Sentence and the Extent of Vocabulary in Young Children*. Iowa City, University of Iowa, 1926. 92 pp.
- Strayer, L. C., "Language and Growth: the Relative Efficacy of Early and Deferred Vocabulary Training Studied by the Method of Co-Twin Control"; *Genetic Psychology Monographs*, vol. 8 (1930), pp. 209-319.
- Thorndike, E. L., *The Teacher's Word Book*. New York, Teachers College, Columbia University, 1921. 134 pp.
- Town, C. H., "Language Development in 285 Idiots and Imbeciles"; *Psychological Clinic*, vol. 6 (1912-13), pp. 229-235.
- Travis, L. E., *Speech Pathology*. New York, Appleton, 1931. 331 pp.
- Van Alstyne, D., *The Environment of Three-Year-Old Children: Factors Related to Intelligence and Vocabulary Tests*. New York, Teachers College, Columbia University, 1929. 109 pp.
- Waring, E. B., *The Relation Between Early Language Habits and Early Habits of Conduct Control*. New York, Teachers College, Columbia University, 1927. 125 pp.
- Wellman, B. L., Case, I. M., Mengert, I. G., and Bradbury, D. E., *Speech Sounds of Young Children*. Iowa City, University of Iowa, 1931. 82 pp.

CHAPTER VIII

- Andrus, R., *An Inventory of the Habits of Children Two to Five Years*. New York, Teachers College, Columbia University, 1928. 51 pp.
- Brian, C. R., and Goodenough, F. L., "The Relative Potency of Color and Form Perception at Various Ages"; *Journal of Experimental Psychology*, vol. 12 (1929), pp. 197-213.
- Brown, M., "Continuous Reaction as a Measure of Attention"; *Child Development*, vol. 1 (1930), pp. 255-291.
- Brownell, W. A., *The Development of Children's Number Ideas in the Primary Grades*. Chicago, University of Chicago Press, 1928. 242 pp.
- Burt, H. E., "An Experimental Study of Early Childhood Memory"; *Journal of Genetic Psychology*, vol. 40 (1932), pp. 287-295.
- Davis, E. A., "The Form and Functions of Children's Questions"; *Child Development*, vol. 3 (1932), pp. 57-74.
- Douglass, H. R., "The Development of Number Concept in Children of Pre-School and Kindergarten Ages"; *Journal of Experimental Psychology*, vol. 8 (1925), pp. 443-470.
- Dunford, R. E., "The Genetic Development of Cutaneous Localization"; *Journal of Genetic Psychology*, vol. 37 (1930), pp. 499-513.
- Eng, H., *The Psychology of Children's Drawings: From the First Stroke to the Colored Drawing*. London, Kegan Paul, Trench, Trubner, 1931. 223 pp.
- Gates, A. I., *The Improvement of Reading*. New York, Macmillan, 1927. 440 pp.

- Jersild, A. T., *Child Psychology*. New York, Prentice-Hall, 1933. 462 pp.
- Leontiev, A. N., "The Development of Voluntary Attention in the Child"; *Journal of Genetic Psychology*, vol. 40 (1932), pp. 52-83.
- Linfert, H. E., and Hierholzer, H. M., *A Scale for Measuring the Mental Development of Infants During the First Year of Life*. Washington, Catholic University of America, 1928. 33 pp.
- McGinnis, E., "Seashore's Measures of Musical Ability Applied to Children of Preschool Age"; *American Journal of Psychology*, vol. 40 (1928), pp. 620-623.
- Moore, T. V., *The Reasoning Ability of Children in the First Years of School Life*. Washington, Catholic University of America, 1929. 34 pp.
- Mott, S. H., "The Development of Concepts (A Study of Children's Drawings)"; *Journal of Genetic Psychology*, vol. 48 (1936), pp. 199-214.
- Piaget, J., *Judgment and Reasoning in the Child*. New York, Harcourt, Brace, 1928. 260 pp.
- Pyle, W. H., *A Manual for the Mental and Physical Examination of School Children* (revised edition). Columbia, Mo., University of Missouri, 1920. 39 pp.
- Roberts, K. E., "The Ability of Preschool Children to Solve Problems in Which a Simple Principle of Relationship Is Kept Constant"; *Journal of Genetic Psychology*, vol. 40 (1932), pp. 118-135.
- Shacter, H. S., "A Method for Measuring the Sustained Attention of Preschool Children"; *Journal of Genetic Psychology*, vol. 42 (1933), pp. 339-371.
- Skalet, M. S., "The Significance of Delayed Reactions in Young Children", *Comparative Psychology Monographs*, vol. 7, no. 4 (1931). 82 pp.
- Staples, R., "The Responses of Infants to Color"; *Journal of Experimental Psychology*, vol. 15 (1932), pp. 119-141.
- Williams, H. M., et al., *The Measurement of Musical Development*. Iowa City, University of Iowa, 1932. 191 pp.

CHAPTER IX

- Aldrich, C. G., and Doll, E. A., "Comparative Intelligence of Idiots and of Normal Infants"; *Journal of Genetic Psychology*, vol. 39 (1931), pp. 227-257.
- Atkins, R. E., *The Measurement of the Intelligence of Young Children by an Object-Fitting Test*. Minneapolis, University of Minnesota Press, 1931. 89 pp.
- Baldwin, B. T., Fillmore, E. A., and Hadley, L., *Farm Children*. New York, Appleton, 1930. 337 pp.
- Bayley, N., "Mental Growth During the First Three Years. A Developmental Study of Sixty-One Children by Repeated Tests"; *Genetic Psychology Monographs*, vol. 14 (1933), pp. 1-92.
- Binet, A., and Simon, T., "Le Développement de l'intelligence chez les enfants", *L'Année Psychologique*, vol. 14 (1908), pp. 1-94.
- Brooks, F. D., *Changes in Mental Traits with Age*. New York, Teachers College, Columbia University, 1921. 86 pp.

- Burks, B. S., Jensen, D. W., and Terman, L. M., *The Promise of Youth*. Stanford University, Calif., Stanford University Press, 1930. 508 pp.
- Capper, A., "The Fate and Development of the Immature and the Premature Child"; *American Journal of Diseases of Children*, vol. 35 (1928), pp. 443-491.
- Cattell, P., "Constant Changes in the Stanford-Binet I.Q."; *Journal of Educational Psychology*, vol. 22 (1931), pp. 544-550.
- Cattell, P., and Gaudet, F. J., "The Inconstancy of the I.Q. as Measured by Repeated Group Tests"; *Journal of Educational Research*, vol. 21 (1930), pp. 21-28.
- Chipman, C. E., "The Constancy of the Intelligence Quotient of Mental Defectives"; *Psychological Clinic*, vol. 18 (1929), pp. 103-111.
- Davidson, H. P., "An Experimental Study of Bright, Average, and Dull Children at the Four-Year Mental Level"; *Genetic Psychology Monographs*, vol. 9 (1931), pp. 125-289.
- Gesell, A., and Lord, A. E., "A Psychological Comparison of Nursery School Children from Homes of Low and High Economic Status"; *Pedagogical Seminary*, vol. 34 (1927), pp. 339-356.
- Goodenough, F. L., *Measurement of Intelligence by Drawing*. Yonkers, World Book, 1926. 177 pp.
- Goodenough, F. L., Foster, J. C., and Van Wagenen, M. J., *The Minnesota Preschool Tests*. Forms A and B. Minneapolis, Educational Test Bureau, 1932. 44 pp.
- Kuhlmann, F., *A Handbook of Mental Tests*. Baltimore, Warwick and York, 1922. 208 pp.
- Leahy, A. M., "Nature-Nurture and Intelligence"; *Genetic Psychology Monographs*, vol. 17 (1935), pp. 235-308.
- Lincoln, E. A., "Stanford-Binet I.Q. Changes in the Harvard Growth Study"; *Journal of Applied Psychology*, vol. 20 (1936), pp. 236-242.
- Mohr, G. J., and Bartelme, P., "Mental and Physical Development of Children Prematurely Born"; *American Journal of Diseases of Children*, vol. 40 (1930), pp. 1000-1015.
- Muller, H. J., "Mental Traits and Heredity; the Extent to Which Mental Traits are Independent of Heredity, as Tested in a Case of Identical Twins Reared Apart"; *Journal of Heredity*, vol. 16 (1925), pp. 432-448.
- Newman, H. H., "Mental and Physical Traits of Identical Twins Reared Apart. Cases I-IV"; *Journal of Heredity*, vol. 20 (1929), pp. 49-64, 97-104, 153-166; and vol. 23 (1932), pp. 2-18.
- Skeels, H. M., "Mental Development of Children in Foster Homes", *Journal of Genetic Psychology*, vol. 49 (1936), pp. 91-106.
- Smith, S., "Influence of Illness During the First Two Years on Infant Development"; *Journal of Genetic Psychology*, vol. 39 (1931), pp. 284-287.
- Spearman, C., *The Abilities of Man*. New York, Macmillan, 1927. 415 pp.
- Taylor, G. A., *An Inventory of the Minds of Individuals of Six and Seven Years Mental Age*. New York, Teachers College, Columbia University, 1923. 147 pp.
- Terman, L. M., and Merrill, M., *Measuring Intelligence*. Boston, Houghton Mifflin, 1937. 412 pp.

- Thorndike, E. L., *et al.*, *The Measurement of Intelligence*. New York, Teachers College, Columbia University, 1927. 616 pp.
- Updegraff, R., "The Determination of a Reliable Intelligence Quotient for the Young Child"; *Journal of Genetic Psychology*, vol. 41 (1932), pp. 152-166.
- Wheeler, L. R., "A Study of the Mental Growth of Dull Children"; *Journal of Educational Psychology*, vol. 21 (1930), pp. 367-378.

CHAPTER X

- Bard, P., "A Diencephalic Mechanism for the Expression of Rage with Special Reference to the Sympathetic Nervous System"; *American Journal of Physiology*, vol. 84 (1928), pp. 490-515.
- Bekhterev, V. M., "Emotions as Somato-Mimetic Reflexes"; *Feelings and Emotions: The Wittenberg Symposium*. Worcester, Mass., Clark University Press, 1928, pp. 270-283.
- Blanton, M. G., "The Behavior of the Human Infant During the First Thirty Days of Life"; *Psychological Review*, vol. 24 (1917), pp. 456-483.
- Bridges, K. M. B., "A Genetic Theory of the Emotions"; *Journal of Genetic Psychology*, vol. 37 (1930), pp. 514-527.
- Crile, G. W., *The Origin and Nature of the Emotions*. Philadelphia, Saunders, 1915. 240 pp.
- Goodenough, F. L., "The Expression of the Emotions in Infancy"; *Child Development*, vol. 2 (1931), pp. 96-101.
- Guthrie, E. R., "Conditioning as a Principle of Learning"; *Psychological Review*, vol. 37 (1930), pp. 412-428.
- Hoskins, R. G., *The Tides of Life: The Endocrine Glands in Bodily Adjustment*. New York, Norton, 1933. 352 pp.
- Jones, H. E., "The Retention of Conditioned Emotional Reactions in Infancy"; *Journal of Genetic Psychology*, vol. 37 (1930), pp. 485-498.
- Kempf, E. J., *Psychopathology*. St. Louis, Mosby, 1921. 762 pp.
- MacCurdy, J. T., *The Psychology of Emotion: Morbid and Normal*. New York, Harcourt, Brace, 1925. 589 pp.
- Moore, Dom. T. V., *Dynamic Psychology*. Philadelphia, Lippincott, 1924. 444 pp.
- Richter, C. P., "High Electrical Resistance of the Skin of Newborn Infants and Its Significance"; *American Journal of Diseases of Children*, vol. 40 (1930), pp. 18-26.
- Rikimaru, J., "Emotion and Endocrine Activities"; *Psychological Bulletin*, vol. 22 (1925), pp. 205-258.
- Watson, J. B., and Rayner, R., "Conditioned Emotional Reactions"; *Journal of Experimental Psychology*, vol. 3 (1920), pp. 1-14.
- Wechsler, D., "The Measurement of Emotional Reactions"; *Archives of Psychology*, no. 76, 1925. 181 pp.

CHAPTER XI

- Bayley, N., "A Study of the Crying of Infants During Mental and Physical Tests"; *Journal of Genetic Psychology*, vol. 40 (1932), pp. 306-329.
- Bridges, K. M. B., "Measuring Emotionality in Infants: A Tentative Experiment", *Child Development*, vol. 5 (1934), pp. 36-40.
- Brown, F., "A Comparative Study of the Influence of Race and Locale Upon Emotional Stability of Children"; *Journal of Genetic Psychology*, vol. 49 (1936), pp. 325-342.
- Chambers, O. R., "A Method of Measuring the Emotional Maturity of Children"; *Pedagogical Seminary*, vol. 32 (1925), pp. 637-647.
- Collman, R. D., *The Psychogalvanic Reactions of Exceptional and Normal School Children*. New York, Teachers College, Columbia University, 1931. 88 pp.
- Ding, G. F., and Jersild, A. T., "A Study of the Laughing and Smiling of Pre-School Children"; *Journal of Genetic Psychology*, vol. 40 (1932), pp. 452-472.
- Duffy, E., "Tensions and Emotional Factors in Reaction"; *Genetic Psychology Monographs*, vol. 7 (1930), pp. 1-77.
- English, H. B., "Three Cases of the 'Conditioned Fear Response'"; *Journal of Abnormal and Social Psychology*, vol. 25 (1929), pp. 221-225.
- Felder, J. G., "Some Factors Determining the Nature and Frequency of Anger and Fear Outbreaks in Pre-School Children"; *Journal of Juvenile Research*, vol. 16 (1932), pp. 278-290.
- Jones, H. E., "The Retention of Conditioned Emotional Reactions in Infancy"; *Journal of Genetic Psychology*, vol. 37 (1930), pp. 485-498.
- Jones, H. E., and Jones, M. C., "Genetic Studies of Emotions"; *Psychological Bulletin*, vol. 27 (1930), pp. 40-64.
- Jones, M. C., "The Development of Early Behavior Patterns in Young Children"; *Pedagogical Seminary*, vol. 33 (1926), pp. 537-585.
- Justin, F., "A Genetic Study of Laughter-Provoking Stimuli"; *Child Development*, vol. 3 (1932), pp. 114-136.
- Keys, M., and Whiteside, G. H., "The Relations of Nervous Emotional Stability to Educational Achievement", *Journal of Educational Research*, vol. 21 (1930), pp. 429-441.
- Landis, C., Gullette, R., and Jacobsen, C., "Criteria of Emotionality"; *Pedagogical Seminary*, vol. 32 (1925), pp. 209-234.
- Marston, L. R., *The Emotions of Young Children. An Experimental Study in Introversiion and Extroversion*. Iowa City, University of Iowa, 1925. 99 pp.
- Pearson, G. H., "The Psychosexual Development of the Child", *Mental Hygiene*, vol. 15 (1931), pp. 685-713.
- Reynolds, M. M., *Negativism of Pre-School Children*. New York, Teachers College, Columbia University, 1928. 126 pp.
- Sewall, M., "Some Causes of Jealousy in Young Children"; *Smith College Studies in Social Work*, vol. 1 (1930), pp. 6-20.
- Valentine, C. W., "The Innate Bases of Fear", *Journal of Genetic Psychology*, vol. 37 (1930), pp. 394-420.

- Watson, J. B., *Behaviorism* (second edition, revised). New York, Norton, 1930. 308 pp.
- Wechsler, D., Crabbs, L. M., and Freeman, R. G., Jr., "Galvanic Responses of Pre-School Children"; *Journal of Genetic Psychology*, vol. 38 (1930), pp. 203-222.

CHAPTER XII

- Benjamin, H., "Age and Sex Differences in the Toy-Preferences of Young Children"; *Journal of Genetic Psychology*, vol. 41 (1932), pp. 417-429.
- Blatz, W. E., and Bott, H., *The Management of Young Children*. New York, Morrow, 1930. 354 pp.
- Bott, E. A., Blatz, W. E., Chant, N., and Bott, H., "Observation and Training of the Fundamental Habits in Young Children"; *Genetic Psychology Monographs*, vol. 4 (1928), pp. 1-162.
- Bridges, K. M. B., "Occupational Interests of Four-Year-Old Children"; *Journal of Genetic Psychology*, vol. 36 (1929), pp. 551-569.
- Bridges, K. M. B., "Occupational Interests of Three-Year-Old Children"; *Journal of Genetic Psychology*, vol. 34 (1927), pp. 415-423.
- Cannon, W. B., "Hunger and Thirst"; *The Foundations of Experimental Psychology* (edited by Murchison), pp. 434-448. Worcester, Mass., Clark University Press, 1929.
- Celestine, Sister M., *A Survey of the Literature on the Reading Interests of Children of Elementary Grades*. Washington, Catholic University of America, 1930. 114 pp.
- Cockrell, D. R., "A Study of the Play of Children of Preschool Age by an Unobserved Observer"; *Genetic Psychology Monographs*, vol. 17 (1935), pp. 377-469.
- Eliot, A. A., "Eating Habits in Relation to Personality Development of Two- and Three-Year-Old Children: A Study of Sixty-Nine Children in Two Nursery Schools"; *Genetic Psychology Monographs*, vol. 13 (1933), pp. 399-481.
- Foster, J. C., "Play Activities of Children in the First Six Grades"; *Child Development*, vol. 1 (1930), pp. 248-254.
- Hattendorf, K. W., "A Study of the Questions of Young Children Concerning Sex; A Phase of an Experimental Approach to Parent Education"; *Journal of Social Psychology*, vol. 3 (1932), pp. 37-65.
- Hildreth, G. H., "Color and Picture Choices of Young Children"; *Journal of Genetic Psychology*, vol. 49 (1936), pp. 427-435.
- Hoelzel, F., "Central Factors in Hunger"; *American Journal of Physiology*, vol. 82 (1927), pp. 665-671.
- Huber, M. B., *The Influence of Intelligence upon Children's Reading Interests*. New York, Teachers College, Columbia University, 1928. 39 pp.
- Hurlock, E. B., "An Evaluation of Certain Incentives Used in School Work"; *Journal of Educational Psychology*, vol. 16 (1925), pp. 145-159.
- Hurlock, E. B., "The Use of Group Rivalry as an Incentive"; *Journal of Abnormal and Social Psychology*, vol. 22 (1927), pp. 278-290.

- Jordan, A. M., *Children's Interest in Reading*. Chapel Hill, N.C., University of North Carolina Press, 1926. 103 pp.
- Leuba, C., "The Measurement of Incentives and their Effect: A Contribution to Methodology and Orientation Resulting from the Experimental Use of Incentives"; *Journal of Social Psychology*, vol. 3 (1932), pp. 107-114.
- Maller, J. B., *Cooperation and Competition: an Experimental Study in Motivation*. New York, Teachers College, Columbia University, 1929. 176 pp.
- McCracken, T. C., and Lamb, H. E., *Occupational Information in the Elementary School*. Boston, Houghton Mifflin, 1923. 250 pp.
- Perrin, F. A. C., "The Psychology of Motivation"; *Psychological Review*, vol. 30 (1923), pp. 176-191.
- Rockwell, A. J., "Probable Causal Factors in Masturbation in Girls Aged Six Years"; *Psychological Clinic*, vol. 18 (1930), pp. 236-241.
- Scoe, H. F., *Bladder Control in Infancy and Early Childhood*. Iowa City, University of Iowa, 1933. 83 pp.
- Seham, M., and Seham, G., *The Tired Child*. Philadelphia, Lippincott, 1926. 342 pp.
- Symonds, P. M., and Chase, D. H., "Practice versus Motivation", *Journal of Educational Psychology*, vol. 20 (1929), pp. 19-35.
- Thom, D. A., *Everyday Problems of the Everyday Child*. New York, Appleton, 1927. 362 pp.
- Uhl, W. L., *The Materials of Reading*. New York, Silver Burdett, 1924. 386 pp.
- Waring, E. B., and Wilker, M., *The Behavior of Young Children*, vols. 1, 2. New York, Scribner's, 1929, 1930. 131 pp., 163 pp.

CHAPTER XIII

- Beaver, A. P., *The Initiation of Social Contacts by Pre-School Children*. New York, Teachers College, Columbia University, 1932. 65 pp.
- Bender, L., and Schilder, P., "Aggressiveness in Children", *Genetic Psychology Monographs*, vol. 18 (1936), pp. 410-525.
- Berne, E. V. C., *An Experimental Investigation of Social Behavior Patterns in Young Children*. Iowa City, University of Iowa, 1930. 93 pp.
- Blatz, W. E., and Bott, E. A., "Studies in Mental Hygiene of Children"; *Journal of Genetic Psychology*, vol. 34 (1927), pp. 552-582.
- Bridges, K. M. B., "A Study of Social Development in Early Infancy"; *Child Development*, vol. 4 (1933), pp. 36-49.
- Burke, D. W., *Youth and Crime*. United States Children's Bureau Publication, 1930. No. 196. 202 pp.
- Caldwell, O. W., and Wellman, B. L., "Characteristics of School Leaders"; *Journal of Educational Research*, vol. 14 (1926), pp. 1-13.
- Challman, R. C., "Factors Influencing Friendships among Pre-School Children"; *Child Development*, vol. 3 (1932), pp. 146-158.
- Furfey, P. H., "Some Factors Influencing the Selection of Boys' Chums"; *Journal of Applied Psychology*, vol. 11 (1927), pp. 47-61.
- Furfey, P. H., *The Growing Boy*. New York, Macmillan, 1930. 192 pp.

- Goodenough, F. L., and Leahy, A. M., "The Effect of Certain Family Relationships upon the Development of Personality"; *Journal of Genetic Psychology*, vol. 34 (1927), pp. 45-71.
- Green, E. H., "Group Play and Quarreling Among Pre-School Children"; *Child Development*, vol. 4 (1933), pp. 302-307.
- Greenberg, P. J., "Competition in Children"; *American Journal of Psychology*, vol. 44 (1932), pp. 221-248.
- Hagman, E. P., *The Companionships of Pre-School Children*. Iowa City, University of Iowa, 1933. 69 pp.
- Hunt, N. M., "Factors Influencing Play of the Pre-School Child"; *Social Science Monographs*, vol. 1 (1931), pp. 18-26.
- Hurlock, E. B., "Experimental Investigations of Childhood Play"; *Psychological Bulletin*, vol. 31 (1934), pp. 47-66.
- Jenkins, G. G., "Factors Involved in Children's Friendships"; *Journal of Educational Psychology*, vol. 22 (1931), pp. 440-448.
- Lacey, J. M., *Social Studies Concepts of Children in the First Three Grades*. New York, Teachers College, Columbia University, 1932. 89 pp.
- Loomis, A. M., *A Technique for Observing the Social Behavior of Nursery School Children*. New York, Teachers College, Columbia University, 1931. 100 pp.
- Maller, J. B., *Cooperation and Competition: An Experimental Study in Motivation*. New York, Teachers College, Columbia University, 1929. 176 pp.
- McCaulley, S., "One Hundred Non-Conformed Boys"; *Psychological Clinic*, vol. 16 (1925), pp. 141-166.
- Parten, M. B., "Leadership Among Pre-School Children," *Journal of Abnormal and Social Psychology*, vol. 27 (1932-33), pp. 430-440.
- Parten, M. B., "Social Participation Among Pre-School Children", *Journal of Abnormal and Social Psychology*, vol. 27 (1932-33), pp. 243-269.
- Parten, M. B., "Social Play Among Pre-School Children"; *Journal of Abnormal and Social Psychology*, vol. 28 (1933), pp. 136-147.
- Seagoe, M. V., "Factors Influencing the Selection of Associates"; *Journal of Educational Research*, vol. 27 (1933), pp. 32-40.
- Terman, L. M., et al., *Genetic Studies of Genius*, vol. 1. Stanford University, California, Stanford University Press, 1925. 648 pp.
- Updegraff, R., and Herbst, E. K., "An Experimental Study of the Social Behavior Stimulated in Young Children by Certain Play Materials"; *Journal of Genetic Psychology*, vol. 42 (1933), pp. 372-391.
- Ward, A., "The Only Child: A Study of One Hundred Only Children Living at Home with Both Parents, Referred to a Child Guidance Clinic"; *Smith College Studies in Social Work*, vol. 1 (1930), pp. 4-65.
- Washburn, R. W., "A Scheme for Grading the Reactions of Children in a New Social Situation"; *Journal of Genetic Psychology*, vol. 40 (1930), pp. 84-99.

CHAPTER XIV

- Adler, Felix, *The Reconstruction of the Spiritual Ideal*. New York, Appleton, 1924. 218 pp.
- Allers, R., *The Psychology of Character*. New York, Macmillan, 1931. 383 pp.
- Beiswanger, G. W., *The Character Value of the Old Testament Stories*. Iowa City, University of Iowa, 1930. 63 pp.
- Bovet, P., *The Child's Religion*. New York, Dutton, 1928. 202 pp.
- Cady, V. M., "The Estimation of Juvenile Incurability"; *Journal of Delinquency Monographs*, 1923. 140 pp.
- Carmichael, A. M., "The Behavior of Six-Year-Old Children When Called upon to Account for Past Irregularities"; *Journal of Genetic Psychology*, vol. 38 (1930), pp. 352-360.
- Chave, E. J., "A Guide to the Study of the Religious Life of Children"; *Religious Education*, vol. 23 (1928), pp. 554-561.
- Coe, G. A., "The Present Crisis in Religious Education"; *Religious Education*, vol. 28 (1933), pp. 181-185.
- Dimock, H. S., and Hendry, C. E., *Camping and Character*. New York, Association Press, 1929. 364 pp.
- Fox, W. H., *The Child's Approach to Religion*. New York, Richard R. Smith, 1930. 95 pp.
- Hartshorne, H., "Securing Firsthand Data as to the Religious Development of Children"; *Religious Education*, vol. 10 (1915), pp. 481-492.
- Hunt, T., *Measurement in Psychology*. New York, Prentice-Hall, 1936. 471 pp.
- Jones, Vernon, "Ideas of Right and Wrong Among Teachers and Children"; *Teachers College Record*, vol. 30 (1929), pp. 529-541.
- Jones, Vernon, *What Would You Have Done?* Boston, Ginn, 1931. 179 pp.
- Jones, Vernon, *Syllabus in the Psychology of Character*. Worcester, Clark University Press, 1932. 78 pp.
- Klein, M., "Criminal Tendencies in Normal Children"; *British Journal of Medical Psychology*, vol. 7 (1927), pp. 177-192.
- Lincoln, E. A., and Shields, F. J., "An Age Scale for the Measurement of Moral Judgments", *Journal of Educational Research*, vol. 23 (1931), pp. 193-197.
- Maller, J. B., *Character Sketches*. New York, Teachers College, Columbia University, 1932. 11 pp.
- National Education Association, *Tenth Yearbook of the Department of Superintendence*. Washington, National Education Association, 1932. 535 pp.
- Osborn, H. F., *Evolution and Religion in Education*. New York, Scribner's, 1926. 240 pp.
- Piaget, J., *The Moral Judgment of a Child*. New York, Harcourt, Brace, 1932. 418 pp.
- Raubenheimer, A. S., "An Experimental Study of Some Behavior Traits of the Potentially Delinquent Boy"; *Psychology Monographs*, vol. 34, no. 159 (1925). 107 pp.
- Selbie, W. H., *The Psychology of Religion*. Oxford, Clarendon Press, 1924. 310 pp.

- Sister Mary, I. H. M., Gannon, M. A., and Moloney, H. M., *An Extension of the Moral Information Test*. Washington, Catholic University of America, 1928. 31 pp.
- Stratton, G. M., *The Psychology of the Religious Life*. London, George Allen, 1911. 376 pp.
- Williams, H. D., "Conflicting Authorities in the Life of the Child"; *Religious Education*, vol. 27 (1932), pp. 413-417.
- Zyve, C., "Experiments in the Teaching of Integrity"; *Teachers College Record*, vol. 32 (1931), pp. 359-374.

CHAPTER XV

- Ackerson, L., "On the Feasibility of Inventorying Children's Behavior Traits"; *Journal of Juvenile Research*, vol. 16 (1932), pp. 32-39.
- Bagby, E., *Psychology of Personality*. New York, Holt, 1928. 236 pp.
- Bernreuter, R. G., *The Personality Inventory and Manual*. Stanford University, Calif., Stanford University Press, 1931.
- Bridges, J. W., "A Theory of Personality"; *Journal of Abnormal and Social Psychology*, vol. 20 (1926), pp. 362-370.
- Brown, W., *Mind and Personality*. New York, Putnam's, 1927. 356 pp.
- Conrad, H. S., "The Validity of Personality Ratings of Pre-School Children"; *Journal of Educational Psychology*, vol. 23 (1932), pp. 671-680.
- Eccles, A. K., "A Modification of the Vineland Adjustment Score Card"; *Training School Bulletin*, vol. 27 (1930), pp. 1-10.
- Eurich, A. C., and Carroll, H. A., *Educational Psychology*. Boston, Heath, 1935. 436 pp.
- Groves, E. R., *Personality and Social Adjustment* (revised edition). New York, Longmans, Green, 1933. 296 pp.
- Jung, C. G., *Psychological Types*. New York, Harcourt, Brace, 1923. 654 pp.
- Kretschmer, E., *Physique and Character*. New York, Harcourt, Brace, 1925. 266 pp.
- McLaughlin, Sister M. A., *The Genesis and Constancy of Ascendence and Submission as Personality Traits*. Iowa City, University of Iowa, 1931. 95 pp.
- Myerson, A., *Social Psychology*. New York, Prentice-Hall, 1934. 640 pp.
- Olson, W. C., "The Clinical Use of Behavior Rating Schedules"; *Journal of Juvenile Research*, vol. 15 (1931), pp. 237-245.
- Olson, W. C., *The Measurement of Nervous Habits in Normal Children*. Minneapolis, University of Minnesota Press, 1929. 97 pp.
- Pressey, S. L., and Pressey, L. C., "Development of the Interest-Attitude Tests"; *Journal of Applied Psychology*, vol. 17 (1933), pp. 1-16.
- Prince, M., "The Structure and Dynamic Elements of Human Personality"; *Journal of Abnormal Psychology*, vol. 15 (1921), pp. 403-413.
- Rogers, C. R., *Measuring Personality Adjustment in Children Nine to Thirteen Years of Age*. New York, Teachers College, Columbia University, 1931. 107 pp.
- Shaffer, L. F., *The Psychology of Adjustment*. Boston, Houghton Mifflin, 1936. 600 pp.

- Spranger, E., *Types of Men*. New York, Stechert, 1928. 402 pp.
- Washburne, J. N., "An Experiment in Character Measurement"; *Journal of Juvenile Research*, vol. 13 (1929), pp. 1-18.
- Watson, G., "Next Steps in Personality Measurement"; *Character and Personality*, vol. 2 (1933-1934), pp. 66-73.
- Weber, C. O., "The Concept of Emotional Age and its Measurement"; *Journal of Abnormal and Social Psychology*, vol. 24 (1930), pp. 466-471.
- Weber, C. O., "Further Tests of the Wells Emotional Age Scale"; *Journal of Abnormal and Social Psychology*, vol. 27 (1932), pp. 65-78.
- Wickman, E. K., *Children's Behavior and Teachers' Attitudes*. New York, Commonwealth Fund, 1928. 247 pp.
- Yepsen, L. N., "Measuring Social Adaptation"; *Journal of Juvenile Research*, vol. 12 (1928), pp. 254-260.

CHAPTER XVI

- Ackerson, L., *Children's Behavior Problems*. Chicago, University of Chicago Press, 1931. 268 pp.
- Brill, M. S., "Motivation of Conduct Disorders in Boys"; *Journal of Delinquency*, vol. 11 (1927), pp. 5-22.
- Caille, R. K., *Resistant Behavior of Pre-School Children*. New York, Teachers College, Columbia University, 1933. 142 pp.
- Coghill, G. E., "Integration and Motivation of Behavior as Problems of Growth"; *Journal of Genetic Psychology*, vol. 48 (1936), pp. 3-19.
- Coghill, G. E., "The Biologic Basis of Conflict in Behavior", *Psychoanalytic Review*, vol. 20 (1933), pp. 1-4.
- Dickson, V. E., "Behavior Difficulties that Baffle Teachers"; *Journal of Juvenile Research*, vol. 16 (1932), pp. 93-101.
- Fitz-Simons, M. J., "Some Parent-Child Relationships as Shown in Clinical Case Studies"; *Journal of Experimental Education*, vol. 2 (1933-1934), pp. 170-196.
- Freud, S., *Psychopathology of Everyday Life*. New York, Macmillan, 1914. 341 pp.
- Jersild, A. T., "A Study of Personality"; *Journal of Abnormal and Social Psychology*, vol. 25 (1930), pp. 115-120.
- Jersild, A. T., "The Constancy of Certain Behavior Patterns in Young Children"; *American Journal of Psychology*, vol. 45 (1933), pp. 125-129.
- Mateer, F., *The Unstable Child*. New York, Appleton, 1924. 471 pp.
- McFie, B. S., "Behavior and Personality Defects in School Children"; *British Journal of Educational Psychology*, vol. 4 (1934), pp. 30-46.
- Mendenhall, G. S., "A Study of Behavior Problems"; *Psychological Clinic*, vol. 21 (1932), pp. 77-113.
- Muenzinger, K. F., "Physical and Psychological Reality"; *Psychological Review*, vol. 34 (1927), pp. 220-233.
- Olson, W. C., *Problem Tendencies in Children*. Minneapolis, University of Minnesota Press, 1930. 92 pp.
- Olson, W. C., *The Measurement of Nervous Habits in Normal Children*. Minneapolis, University of Minnesota Press, 1929. 97 pp.

- Powers, N. E., "An Application of the Marston Introversion-Extroversion Rating Scale"; *Journal of Educational Psychology*, vol. 19 (1928), pp. 168-174.
- Remer, L. L., "Handicaps of School Entrants: A Study of Traits Which Handicap Children Entering Kindergarten and First Grade"; *University of Iowa Studies in Child Welfare*, vol. 6 (1932), pp. 195-207.
- Rowe, A. W., "A Possible Endocrine Factor in the Behavior Problems of the Young"; *American Journal of Orthopsychiatry*, vol. 1 (1931), pp. 451-475.
- Sullenger, T. E., "Juvenile Delinquency a Product of the Home"; *Journal of Criminal Law and Criminology*, vol. 24 (1934), pp. 1088-1092.
- Sullivan, H. S., "The Onset of Schizophrenia"; *American Journal of Psychiatry*, vol. 7 (1927), pp. 105-134.
- Tilson, M. A., *Problems of Pre-School Children*. New York, Teachers College, Columbia University, 1929. 90 pp.
- White, W. A., *Mechanisms of Character Formation*. New York, Macmillan, 1916. 342 pp.
- Williams, H. D., "Causes of Social Maladjustment in Children"; *Psychological Monographs*, vol. 43 (1932), pp. 276-300.

CHAPTER XVII

1. Physical Hygiene

- Barnes, M. F., *Feeding the Child from Two to Six*. New York, Macmillan, 1928. 206 pp.
- Foster, J. C., *Busy Childhood*. New York, Century, 1933. 303 pp.
- Galloway, T. W., *The Biology of Sex for Parents and Teachers*. New York, Heath, 1913. 105 pp.
- Garrison, C., *Permanent Play Materials for Young Children*. New York, Scribners, 1926. 122 pp.
- Gruenberg, B. C., *Parents and Sex Education: For the Parents of Young Children* (third edition) New York, Viking Press, 1932. 112 pp.
- Hattendorf, K. W., *A Home Program for Mothers in Sex Education*. Iowa City, University of Iowa, 1932. 288 pp.
- McCollum, E. V., and Simmonds, N., *The Newer Knowledge of Nutrition*. New York, Macmillan, 1925. 675 pp.
- Owings, C., "Sex Education for Parents"; *Journal of Social Hygiene*, vol. 14 (1928), pp. 524-538.
- Roberts, L., *Nutrition Work with Children*. Chicago, University of Chicago Press, 1927. 394 pp.
- Seagrave, Mabel, "Causes Underlying Sex Delinquency in Young Girls"; *Journal of Social Hygiene*, vol. 12 (1926), pp. 523-529.
- Strain, F. B., *New Patterns in Sex Teaching*. New York, Appleton-Century, 1934. 242 pp.
- Stuart, H. C., *Healthy Childhood*. New York, Century, 1933. 393 pp.
- Wood, T. D., and Rowell, H. G., *Health Supervision and Medical Inspection of Schools*. Philadelphia, Saunders, 1927. 637 pp.

2. *Mental Hygiene*

- Brunk, C., "The Effects of Maternal Over-Protection on the Early Development and Habits of Children", *Smith College Studies in Social Work*, vol. 2 (1931-1932), pp. 261-273.
- Burnham, W. H., *The Wholesome Personality*. New York, Appleton, 1932. 713 pp.
- Cornell, E. L., *Mental Hygiene: Its Place in the Classroom*. Albany, N.Y., University of the State of New York, Bulletin no. 875, 1927. 19 pp.
- Eliot, T. D., "Why Family Harmony?" *Mental Hygiene*, vol. 16 (1932), pp. 85-100.
- Glueck, B., "The Significance of Parental Attitudes for the Destiny of the Individual"; *Mental Hygiene*, vol. 12 (1928), pp. 722-741.
- Kasavin, J., and Kaufman, M. R., "A Study of the Functional Psychoses in Childhood"; *American Journal of Psychiatry*, vol. 9 (1929), pp. 307-384.
- Klein, M., *The Psychoanalysis of Children*. New York, Norton, 1932. 393 pp.
- Levy, J., "A Clinical Study of the Application of Mental Hygiene to the Treatment of Children's School Problems"; *Journal of Genetic Psychology*, vol. 41 (1932), pp. 439-461.
- Lowry, L. G., "Competitions and the Conflict over Difference: The 'Inferiority Complex' in the Psychopathology of Childhood"; *Mental Hygiene*, vol. 12 (1928), pp. 316-330.
- Lowry, L. G., "Psychiatric Methods and Technique for Meeting Mental Hygiene Problems in Children of Pre-School Age"; *Mental Hygiene*, vol. 13 (1929), pp. 473-482.
- Meyer, A., "What Do Histories of Cases of Insanity Teach Us Concerning Preventive Mental Hygiene During the Years of School Life?" *Psychological Clinic*, vol. 2 (1908), pp. 89-101.
- Moore, E. S., *The Development of Mental Health in a Group of Young Children: An Analysis of Factors in Purposeful Activity*. Iowa City, University of Iowa, 1931. 128 pp.
- Wickes, F. G., *The Inner World of Childhood*. New York, Appleton, 1927. 379 pp.
- Wile, I. S., "Mental Hygiene in Childhood"; *Journal of the American Medical Association*, vol. 93 (1929), pp. 1874-1878.
- Wittles, F., *Set the Children Free*. London, Allen and Unwin, 1932. 242 pp.

CHAPTER XVIII

- Anastasi, A., "The Influence of Specific Experience upon Mental Organization"; *Genetic Psychology Monographs*, vol. 18 (1936), pp. 245-355.
- Bott, H. McM., *Personality Development in Young Children*. Toronto, University of Toronto Press, 1934. 139 pp.
- Bryan, A. I., "Organization of Memory in Children"; *Archives of Psychology* (1934), no. 162. 56 pp.
- Christie, A., "Physical Defects in Delinquent Boys"; *Journal of Juvenile Research*, vol. 18 (1934), pp. 13-22.

- Davenport, C. B., and Minogue, B. M., "The Intelligence Quotient and the Physical Quotient: Their Fluctuation and Intercorrelation"; *Human Biology*, vol. 2 (1930), pp. 473-507.
- Fisher, M. L., "Measured Differences between Problem and Non-Problem Children in a Public School System"; *Journal of Educational Sociology*, vol. 7 (1934), pp. 353-364.
- Fox, E. J., "An Investigation of the Effect of Glandular Therapy on the Intelligence Quotient"; *Mental Hygiene*, vol. 12 (1928), pp. 90-102.
- Gesell, A., "Precocious Puberty and Mental Maturation"; Chapter 19, *Twenty-Seventh Yearbook of the National Society for the Study of Education*, Part 1. Bloomington, Ill., Public School Publishing Company, 1928. 465 pp. See also *Genetic Psychology Monographs*, vol. 1, no. 6.
- Glueck, S., and Glueck, F. T., *One Thousand Juvenile Delinquents*. Cambridge, Mass., Harvard University Press, 1934. 341 pp.
- Goodenough, F. L., "Interrelationships in the Behavior of Young Children"; *Child Development*, vol. 1 (1930), pp. 29-47.
- Hollingworth, L. S., "Do Intellectually Gifted Children Grow toward Mediocrity in Stature?" *Journal of Genetic Psychology*, vol. 37 (1930), pp. 345-360.
- Hollingworth, L. S., and Gray, H. A., "Juvenile Achievement as Related to Size", *Teachers College Record*, vol. 32 (1930), pp. 236-244.
- Hughes, W. H., "Relation of Intelligence to Trait Characteristics"; *Journal of Educational Psychology*, vol. 17 (1926), pp. 482-494.
- Johnson, B. J., *Mental Growth of Children in Relation to the Rate of Growth in Bodily Development*. New York, Dutton, 1925. 160 pp.
- Mohr, A. M., "Beauty as Related to Intelligence and Scholarship"; *Psychological Bulletin*, vol. 29 (1932), pp. 564-565.
- Murray, V., "A Comparative Study of Play Information and Athletic Achievement in Delinquent and Non-Delinquent Boys"; *Journal of Juvenile Research*, vol. 15 (1931), pp. 111-120.
- O'Shea, H. E., "'Habits' of Three Successive Nursery-School Groups and Some Relations between Traits", *Journal of Genetic Psychology*, vol. 41 (1932), pp. 167-191.
- Paterson, D. G., *Physique and Intellect*. New York, Century, 1930. 304 pp.
- Perkins, F. J., "The Relation of Dentition to Mental Age"; *Journal of Genetic Psychology*, vol. 33 (1926), pp. 387-398.
- Reusser, J. L., "Personal Attitudes of Delinquent Boys"; *Journal of Juvenile Research*, vol. 17 (1933), pp. 19-34.
- Schiller, B., "Verbal, Numerical, and Spatial Abilities of Young Children"; *Archives of Psychology* (1934), no. 161. 67 pp.
- Skeels, H. M., "A Study of Some Factors Influencing Form-Board Accomplishments of Two- and Three-Year-Old Children"; *Journal of Genetic Psychology*, vol. 40 (1932), pp. 375-395.
- Stone, C., and Doe-Kulmann, L., "Notes on the Mental Development of Children Exhibiting the Somatic Signs of Puberty Praecox"; Part 1, pp. 388-397 of *Twenty-Seventh Yearbook of the National Society for the Study of Education*. Bloomington, Ill., Public School Publishing Company, 1928.

- Sullivan, C., "A Scale for Measuring Developmental Age in Girls"; *Studies in Psychology and Psychiatry*, vol. 3, no. 4, 1934. 65 pp.
- Wellman, B. L., "Physical Growth and Motor Development and Their Relation to Mental Development in Children"; in *A Handbook of Child Psychology*, pp. 242-277 (edited by Murchison). Worcester, Mass., Clark University Press, 1931. 711 pp.
- Westenberger, E. J., *A Study of the Influences of Physical Defects upon Intelligence*. Washington, Catholic Education Press, 1927. 53 pp.
- Wheeler, L. R., "A Comparative Study of the Physical Growth of Dull Children"; *Journal of Educational Research*, vol. 20 (1929), pp. 273-282.
- White, R., and Fenton, N., "Aspects of Delinquency and Superior Mentality"; *Journal of Juvenile Research*, vol. 15 (1931), pp. 101-107.
- Williams, H. D., "A Survey of Pre-Delinquent School Children of Ten Mid-Western Cities"; *Journal of Educational Sociology*, vol. 7 (1934), pp. 365-370.
- Williams, H. M., "A Study in the Prediction of Motor Rhythmic Performances of School Children"; *Journal of Genetic Psychology*, vol. 43 (1933), pp. 377-388.

CHAPTER XIX

- Anderson, J. E., *Happy Childhood*. New York, Century, 1933. 321 pp.
- Bailey, E. W., Laton, A. D., and Bishop, E. L., *Outline for Study of Children in Schools*. New York, McGraw-Hill, 1933. 248 pp.
- Blatz, W. E., and Bott, H. M., *The Management of Young Children*. New York, Morrow, 1930. 354 pp.
- Brown, R. W., "The Relation Between Age (Chronological and Mental) and Rate of Piano Learning", *Journal of Applied Psychology*, vol. 20 (1936), pp. 511-516.
- Cabot, F. P. (editor), *The Delinquent Child*. (Committee Report, White House Conference on Child Health and Protection.) New York, Century, 1932. 499 pp.
- Caldwell, M. G., "The Economic Status of Families of Delinquent Boys in Wisconsin"; *American Journal of Sociology*, vol. 37 (1931), pp. 231-239.
- Casselberry, W. S., "Analysis and Prediction of Delinquency"; *Journal of Juvenile Research*, vol. 16 (1932), pp. 1-31.
- Driscoll, G. P., *The Developmental Status of the Pre-School Child as a Prognosis of Future Development*. New York, Teachers College, Columbia University, 1933. 111 pp.
- Drucker, S., and Hexter, M. B., *Children Astray*. Cambridge, Harvard University Press, 1925. 421 pp.
- Faegre, M. L., and Anderson, J. E., *Child Care and Training*. Minneapolis, University of Minnesota Press, 1929. 274 pp.
- Foster, J. C., "Play Activities of Children in the First Six Grades"; *Child Development*, vol. 1 (1930), pp. 248-254.
- Gesell, A., "Growth Factors in Child Guidance"; *Mental Hygiene*, vol. 16 (1932), pp. 202-207.

- Groves, E. R., and Groves, G. H., *Wholesome Parenthood*. Boston, Houghton Mifflin, 1929. 320 pp.
- Langdon, G., *Home Guidance for Young Children: A Parents' Handbook*. New York, Day, 1931. 405 pp.
- Reckless, W. C., and Smith, M., *Juvenile Delinquency*. New York, McGraw-Hill, 1932. 412 pp
- Richards, E. L., "Dispensary Contacts with Delinquent Trends in Children: Group I, Forty-Eight Cases of Stealing"; *Mental Hygiene*, vol. 8 (1924), pp 912-947.
- Sachs, B., *The Normal Child and How to Keep It Normal in Mind and Morals*. New York, Hoeber, 1926. 111 pp.
- Seagrave, M., "Causes Underlying Sex Delinquency in Young Girls"; *Journal of Social Hygiene*, vol. 12 (1926), pp 523-529.
- Shaw, C. R., *Delinquency Areas: A Study of the Geographic Distribution of School Truants, Juvenile Delinquents, and Adult Offenders in Chicago*. Chicago, University of Chicago Press, 1929. 214 pp
- Stogdill, R. M., "The Measurement of Attitudes Toward Parental Control and the Social Adjustments of Children", *Journal of Applied Psychology*, vol. 20 (1936), pp 359-367.
- Sullenger, T. E., *Social Determinants in Juvenile Delinquency*. Omaha, Nebraska, Douglas Printing Company, 1930. 87 pp
- Thomas, C., "Results of the Sims Socio-Economic Rating Scale When Given to Delinquent and Non-Delinquent Juveniles"; *American Journal of Orthopsychiatry*, vol. 1 (1931), pp. 527-539.
- Thrasher, F. M., *The Gang*. Chicago, University of Chicago Press, 1927. 571 pp.
- Tilson, M. A., *Problems of Pre-School Children: A Basis for Parental Education*. New York, Teachers College, Columbia University, 1929. 90 pp.
- U.S. Children's Bureau; *Facts About Juvenile Delinquency*. Washington, U.S. Children's Bureau Publication, 1932, no 215. 45 pp.
- Van Waters, M., *Parents on Probation*. New York, Republic, 1927. 333 pp.
- White, W. A., *Crime and Criminals*. New York, Farrar and Rinehart, 1933. 276 pp.

GLOSSARY*

adolescence, the period in human life during which the reproductive functions mature; i. e., from the onset of puberty (following the close of the period of childhood) until manhood or womanhood

adrenal glands (ăd rē'nāl), the two endocrine (or ductless) glands located near the kidneys (whence their name). They have no functional relation to the kidneys. They secrete adrenin.

adrenin (ăd rēn'in), the substance secreted by the adrenal glands.

alienation, coefficient of, a statistical term which shows the lack of relation between two correlated traits or variables. Its symbol is k and is given by the expression $(1-r^2)^{\frac{1}{2}}$.

altitude of intellect, the aspect of intellect measured by the level or difficulty of mental tests.

amniotic (ăm'nî ăt'ik), referring to amnion, a thin membrane forming a closed sac about the embryo of a reptile, bird, or mammal.

autonomic (ăt'tō nôm'ik), the division of the nervous system controlling the internal changes which take place in emotion, through the innervation of smooth muscles and gland cells.

axon, axone (ăk'sôn), the fiber projecting from the cell-body of a neuron, which conducts the nerve impulse away from the cell-body toward the dendrites of the next neuron in the chain.

catharsis (ka thar'sis), literally, purgation. In older psychology catharsis referred to the doctrine that early wrong-doing *per se* immunized against later wrong-doing.

cephalo-caudal (sē fāl'ô kô'dăl), the axis of reference passing from head to tail.

chromosome (krô'mô sôm), a small body containing chromatin, found in the nucleus during mitotic cell division. They are believed to contain the *genes* which are responsible for hereditary traits.

correlation, coefficient of, the degree of relation or association between certain paired measures, expressed numerically or as a ratio. See p. 512.

cycloid (sî'kloid), used to designate a type of personality tending toward cyclothymia, i. e., oscillating between exaltation and depression, due to faulty character development (Kretschmer).

cytoplasm (sî'tô plăz'm), the protoplasm of the cell exclusive of the nucleus.

dendrite (dēn'drit), a process of a neuron which conducts the nerve impulse toward the cell-body.

differentiation, or **specialization**, see p. 293.

diffuse movement, or **diffused response**, responsive activity which is not definite and specific as in the reflex, but involves widespread and uncoordinated responsive reactions in the organism.

* Many of the definitions in this glossary are taken from Warren's *Dictionary of Psychology*, Boston, Houghton Mifflin Co.

ectoderm (ĕk'tō dŭrm), the outer germ layer of the embryo.

entoderm (ĕn'tō dŭrm), the inner layer of cells in the embryo.

epiphysis (ĕp if'ī sīs, pl. -ses (sēz)), a part or process of a bone which ossifies separately and subsequently becomes united to the main part of the bone.

extinction, or **extinctive inhibition**, the weakening or abolition of a conditioned response by repeated excitation without reinforcement by the primary or unconditioned response

extroversion (or **extraversion**), an attitude or type of personality in which one's interests are directed mainly toward external nature and social phenomena, rather than toward himself and his own experiences.

ganglion (pl. **ganglia**), a cluster of nerve cells lying outside the brain and spinal cord, as in the sympathetic division of the nervous system. Also used to refer to a mass of cells within the brain, e.g., basal ganglia.

gene, a factor in the germ cells which is involved in the production of a hereditary character and is commonly supposed to be located in a chromosome.

glycogen (gli'kō jĕn), a white, tasteless carbohydrate, related to starch and dextrin, found especially in the liver.

hormone (hōr'mōn), a specific chemical substance formed by one organ, which, on passing into the circulatory fluid, evokes functional changes in other organs.

immunization, the protection of an organism, through inoculation, against some specific germ disease.

integration, the process by which material of any sort becomes organized, or systematically arranged, into units of a higher order.

intelligence quotient, mental age divided by chronological age, the result being expressed as a per cent.

introversion, an attitude or type of personality in which one's psychic energy is directed toward oneself and one's own experiences.

I.Q., abbreviation for intelligence quotient.

irradiation, or **generalization**, *see* p. 293.

mass activity, *see* diffuse movement.

maturation hypothesis, the theory that certain modes of behavior are inherited, but are not capable of performance upon presentation of the proper stimulus until the appropriate organs (or specific innate neural pathways) have matured

mesoderm (mēs'ō dŭrm), the middle germ layer, lying between the *ectoderm* and *entoderm*.

negative adaptation, gradual cessation of response to a continuous or repeated stimulus.

neuron, **neurone** (nŭ'rōn), a neural element, consisting of a cell-body with its projections, including dendrites, axon, and collaterals.

ossification ratio, the ratio of the ossified area of the wrist bones (as shown by radiographs) to the area of a certain "carpal quadrilateral" The ratio is used to eliminate the influence of differences in general size of skeleton.

overt response, or **behavior**, any response which involves changes in muscles or glands (or both) that can be easily observed by another person.

partial correlation, the correlation between two traits or variables independent of the influence of one or more other traits or variables.

physiological gradient, a line of decreasing intensity of the vital reaction which results from stimulation.

polar bodies, *see* p. 21.

proximo-distal (prók'si mō dīs'tal) sequence, *see* p. 39.

puberty (pū'bēr tī), the earliest age at which an individual is capable of bearing or begetting offspring

recapitulation theory, the theory that organisms pass through stages in which they resemble types which have occurred in the evolution of their respective ancestors, i.e., they *recapitulate* the history of the species

regression equation, an equation used in statistics by which one variable may be estimated from knowledge of one or more other variables with which it is correlated.

reinforcement, the action of one neural excitatory process upon a second, such that it increases the intensity or efficiency of the second.

schizoid (skiz'oid), a shut-in or introverted personality, unsocial, given to phantasy, whose emotional life is more or less dissociated from his ideational content, on account of abnormal mental development (Kretschmer).

S.D., abbreviation for standard deviation.

spirometer (spī rōm'ē tēr), an instrument used to measure the amount (volume) of air exhaled

standard deviation, a measure of the variability or dispersion of a series of measures, the square root of the average of the squares of the deviations of a series of measures from their arithmetic average, or other measure of central tendency

synapse (sīn'āps), the region of contact between the end of one neuron and the beginning of the next in the neural chain.

visceral, referring to the large internal organs of the body.

INDEX

- Absurdities, detecting, 238-239
 Acceleration, negative, 209-212, positive, 208, 210-212; zero, 209-212
 Accuracy, of voluntary movement, 159-161
 Ackerson, L., 265, 268, 421, 459
 Adair, F. L., 123
 Adams, J., 236-238
 Adams, S., 177
 Adjustment, nature of, 451-457; and personality, 456-457; questionnaires, 432-435
 Adjustments, personality, of children, 451-476
 Adler, A., 385, 453, 557
 Affection, dangers in development of, 318-319, development of, in children, 317-319
 Age, effect of, upon children's morals, 407-409; and language development, 200
 Alienation, coefficient of, 541-542
 Allen, C. N., 223
 Alley, A. G., 110
 Allport, F. H., 174, 175, 431
 Almack, J. C., 480, 487, 509
 Anderson, H. H., 358, 551
 Anderson, J. E., 11, 12, 17, 97, 557
 Anger, causes of, in children, 297-299; in children, 296-302, more common than other emotions, 296-297; overt behavior of children, during, 300
 Anxiety and "nervousness," 466-468
 Aptitude, and interest, 345-346
 Arey, L. B., 30, 33, 48
 Arms, growth of, 120-121
 Armstrong, D. B., 490
 Arrington, R. E., 440, 538
 Arthur, G., 252
 Attention, 218-221; during first two years, 218-219; factors determining, 220-221; and interest, 220-221, sustained, after the first two years, 219-220
 Attention-getting mechanisms, 458
 Attitude, objective, in child care and training, 554-557
 Auditory discrimination, 216
 Austin, O. L., 537
 Autonomic nervous system, 278-280
 Averill, L. A., 490
 Ayres, J. G., 106, 119, 138
 Ayres, M., 490
 Babcock, M. E., 129
 Back, strength of, 163
 Back-cross, 23
 Baker, H. J., 476
 Baldwin, B. T., 106-117, 119, 120, 123, 127-129, 134, 138, 155, 158-164, 167, 223, 224, 241, 264, 265, 274, 391, 513, 521, 522
 Baldwin-Wood weight-height-age tables, 114-117
 Ballard, P. B., 245
 Bancroft, J. H., 489
 Bardeen, C. R., 124
 Barker, M., 377
 Barrett, H. E., 271
 Bartelme, P., 103
 Bartlett, F. H., 485
 Bateman, W. G., 173
 Bayley, N., 259-260, 269-270, 274, 292, 440, 544
 Bean, C. H., 179, 186
 Bean, R. B., 106, 124
 Beasley, W. C., 94
 Behavior, of the newborn infant, 83-84
 Belongingness, as a principle of learning, 78
 Benjamin, J., 459
 Berry, R. J. A., 129
 Beyer, T. P., 12
 Bias, personal, as source of error, 4
 Bickersteth, M. E., 218, 219
 Bigelow, M. A., 490, 509
 Binet, A., 15, 242, 243, 249
 Biographies, anecdotal, 4; systematic, 12-13
 Blachly, M. E. O., 201
 Blanchard, P., 412, 421, 510, 557
 Blanton, M. G., 80, 84, 86, 87, 90, 93, 98, 179, 205, 421, 450, 510; quoted, 430
 Blanton, S., 80, 179, 205, 421, 450, 510; quoted, 430
 Blatz, W. E., 80, 97, 295, 323, 332, 358, 459, 510, 557
 Blood pressure, during childhood, 126

- Boas, F., 106, 107
 Bolton, J. S., 37
 Bonham, M. A., 440
 Boring, E. G., 11, 80, 295
 Bott, H., 80, 295, 323, 332, 358, 510
 Boynton, B., 106, 108, 111, 138, 515
 Brace, D. K., 166, 167
 Brace motor ability tests, 166-167
 Brackett, C. W., 369
 Bradbury, D. E., 180, 201
 Brain, growth of, 130-132; growth curves of, 130-131; growth of, in relation to general bodily growth, 131-132
 Brainard, P. P., 153
 Brandenburg, G. C., 12, 187
 Breathing capacity, changes in, during childhood, 127-129, ratio of, to height, 129; ratio of, to weight, 129; relation of, to height and weight, 129
 Breed, F. S., 149
 Brian, C. R., 316
 Bridges, K. M. B., 17, 286-291, 295, 298, 302, 303, 306, 323, 365-367, 377, 380, 383, 391, quoted, 291
 Bridges scale, for measuring social development of pre-school children, 365-367
 Bronner, A. F., 319, 411, 412, 414, 421, 537
 Brooks, F. D., 77, 124, 191, 221, 252, 264, 266, 345, 357, 401, 425, 426, 497, 514, 515, 519, 521, 523, 537, 539, 540, 550; quoted, 417-418
 Bruner, H. B., 353, 355, 358
 Bryan, E. S., 85, 88, 90, 94, 95, 97, 141
 Bryan, W. L., 157, 161
 Buhler, C., 83, 97, 98, 104, 172, 361-365, 374, 386, 392
 Burk, F., 10, 106
 Burks, B. S., 274
 Burlage, S. R., 125, 126
 Burnside, L., 144
 Burt, C., 234, 235, 238, 239, 411, 414, 537; quoted, 234-235, 238-239
 Burton-Opitz, R., 164
 Busby, L. M., 123
 Buswell, G. T., 191
 Cady, V. M., 401, 490
 Calkins, L. A., 33-36, 38, 39, 48
 Campbell, C. M., 476; quoted, 328
 Camps, effect of, upon the child's social development, 388-390
 Canestrini, S., 95
 Cannon, W. B., 280, 281, 295
 Carlson, A. J., 40
 Carman, A., 215
 Carmichael, L., 33, 40, 42, 48, 69, 149, 280, 391, 450
 Carroll, H. A., 450, 476
 Carter, T. M., 121, 521
 Case, I. M., 180, 201
 Case studies, 13, 468-472, 524-536; of children of average mental ability, 530-533; daydreaming, 471-472; of intellectually gifted children, 524-530, lying, 470-471; of mentally dull children, 533-536; nervousness, 469-470; timidity, fear, and dependence, 471; violent temper, 468-469
 Castner, B. M., 54, 153, 154
 Catharsis, theory of, 10
 Cattell, P., 122, 123, 274, 522
 Cattell dental age scale, 122
 Celestine, Sister M., 353
 Cell, structure of, 20
 Cephalic index, decrease in, 118
 Cephalo-caudal sequence, 43-44, 53-54
 Chant, N., 97
 Chapman, J. C., 168
 Chapman, R. W., 490
 Character, children's, 393-415; factors affecting, 407-415, habits, knowledge, and ideals, as elements of, 398-399; integration of traits of, 520, meaning and nature of, 393-400, measurement of, 400-403; rôle of ideals or socialized motives in, 399-400
 Charters, W. W., 414, 421
 Chase, I., 551
 Chave, E. J., 401; quoted, 417-418
 Chest girth, 120
 Chevaleyra, E., 378
 Child, C. M., 33, 37, 48, 129
 Childhood, significance of, 1, problems of, 1-2 *See also* Character, Development, Emotion, Growth, Integration, Intelligence, Language, Personality
 Child behavior, origins of, Chap. II, prediction of, 539-547
 Child hygiene, 477-510
 Child nature, unreliable theories of, 6-10
 Child psychology, field of, 2; methods of, 3-6, 10-17; problems of, 1-2; scientific method in, 10-17; use of statistical methods in, 15-16
 Child training, general principles of, 548-558

- Children's religion, 415-421
 Chromosomes, 20-25
 Church, and mental hygiene, 507-509
 Circulatory system, 124-126
 Climbing, 147-148
 Clubs, effect of, upon the child's social development, 388-390
 Coghill, G. E., 33, 37, 40, 41, 42, 43, 48, 149; quoted, 43
 Collins, S. D., 523
 Colors, perception of, 215-217
 Colvin, S. S., quoted, 244
 Companions, school, 375-376
 Compensation, the mechanism of, 460-461; in the organization of traits, 512-513
 Comprehension, of language, 180
 Concepts, social, of children six to twelve years of age, 373-374
 Conditioned response, 57-68; conditioning, 58-61, differential conditioning, 67-68; fading vs retention, 62-63; generalization, 61-62; specialization and individuation, 65-67, unconditioning, 63-65
 Conduct, external and internal authority, as the sanction of, 395-396; levels of, 404-406; tests of, 401-402
 Conflicts, children's, 379-383; between groups, 382-383, between individuals, 379-382; of motives and thwarting, 455-456; treatment of, 383
 Conformity, as a motive, 340-341
 Conrad, H. S., 356
 Constancy of I.Q., 270-272
 Contiguity, as a principle of learning, 74
 Control, of children, 547-557; emotional, 319-322; head, 141-142; muscular, 139-140, relation of, to prediction, 547-548
 Control group, 16-17
 Conversation, parts of speech used in, 189-190
 Cook, W. M., 215, 217
 Coordination, of arms during early infancy, 91-92; of eyes of infants, 93, motor, 139-141
 Cornell, E. L., 430
 Correlation, coefficient of, 512, of physical traits, 513-515. *See also* Integration
 Correspondence theory, 10
 Courtis, S. A., 556
 Coxe, W. W., 430
 Crossing-over, 26
 Crying, of pre-school children, 369
 Cuff, N. B., 188
 Cunningham, B. V., 165-166
 Cureton, E. E., 146
 Curry, C. M., 353, 355, 358
 Curtis, H. S., 489
 Cytoplasm, 20
 Daniel, R. P., 537
 Dashiell, J. F., 69, 80, 327, 329, 333, 358, 391, 428, 450, quoted, 337
 Davenport, C. B., 106, 132
 Dawson, H. L., 138, 172
 Day, E. J., 177, 184, 190, 201-204
 Daydreaming, 463-465
 Dearborn, G. V. N., 12
 Dearborn, W. F., 242, 245, 275
 Defense mechanisms, 456
 Delight, 314-316; causes of, 314-315; an early emotional response, 289-290
 Delinquents, intelligence of, 537, personality traits of, 537-538, physical traits of, 537
 Dennis, W., 54
 Dental age scale, 122
 Dentition, 121-123
 Determiners, hereditary, 27-28
 Development, of the child's personality, the school's responsibility for, 474-475; of the child's personality, the parents' responsibility for, 473-474; of climbing, 147-148; of desirable and undesirable emotional patterns, 294-295; of emotional patterns, 289-295; of grasping, 153-155, of independence, 441-442, intellectual, predicting, 543-544; of judgment and reasoning, 231-240, of jumping, 149; of language, 173-206; of language, factors influencing, 200-205; of language habits in the infant, 173-176; of language, as influenced by physiological condition and motor ability, 200-201; of leadership during the first twelve years, 377-379; and learning, 49-57; of locomotion, 143-152; of memory, 221-231; of mental functions, 207-241; moral, prediction of, 546-547; moral, stages in, 403-406; of motives, 336-342; of motor capacities, 139-172; motor, sequence in, 140-141; of muscular strength, 162-164; of personality traits, 438-450, physical and motor, prediction of, 543; of prehension, 153-155; prenatal, continuity of, 47; prenatal, of motor responses, 39-43; prenatal sensory, 44-

- 45; of reading, 190-197, of religious beliefs, 415-419, religious, prediction of, 546-547; of running, 148-149, of self-confidence, 441-444; of self-control, 444; of sensory and perceptual capacities, 213-218; social, of children, 359-392; social, measurement of, by the Bridges scale, 365-367, social, factors affecting, 384-391, social, after the pre-school years, 373-377; social, relation of language to, 371-372, social, shown by children's play, 383-384; social, prediction of, 546; of steadiness of motor control, 161-162; of structure, prenatal, 29-39; of word meanings, 182-183
- Dewey, John, 343, 396; quoted, 344, 397, 477
- Diet and nutrition, of children, 485-486
- Differential conditioning, 67-68
- Differentiation, of specific from general behavior, 54-57
- Diffuse and specific reactions during early infancy, 101-103
- Dimock, H. S., 389
- Discipline, in child training, 549-550
- Discrimination of weights, 216-217
- Disease, prevention and treatment of, 490-492
- Distraction, test of, 435
- Distress, an early emotional response, 289-290
- Dockeray, F. C., 69, 80, 358, 391, 450
- Doisy, E. A., 129
- Dolch, E. W., 186, 196
- Dominant trait, 22-23
- Donaldson, H. H., 129
- Doran, E. W., 173, 186
- Doroschenko, O., 390-391
- Drain, C. L., 123
- Drives, sources of, 329-336
- Dunlap, J. W., 146
- Dunlap, K., 69, 76, 80, 295, 476
- Dunn, H., 129
- Duplex, 22-23
- Ectoderm, 31
- Effect, law of, in learning, 74-75
- Elimination, as a drive, 331-332
- Ellis, R. S., 129
- Embryonic period, 30-33
- Emerson, W. R. P., 485, 509
- Emotion, 276-323; affection, 317-319; anger, 296-302; bodily changes in, 277-278, Cannon's emergency theory of, 280-281; of children, how studied, 281-286, conditioning responses, 292-294, delight, 314-316, development of desirable and undesirable patterns of, 294-295; development of patterns of, 289-295, earliest, of infants, 286-287, evidences of, in infants, 281-282; fear, 302-309; in infancy, 100-101; of infants, difficulties in judging, 283-284, jealousy, 309-313; joy, 314-316, learning in the development of, 292-294, maturation in the development of, 290, 292, meaning of, 276-277; nature of, 276-281; neural basis of, 278-280; of pre-school children, studying, 284, of school children, studying, 284-286; as source of motive, 335-336
- Emotional behavior, beginnings of, 286-289; of children, 296-323
- Emotional control, developing, in children, 319-322
- Emotional maturity, and intelligence, 523
- Emotional stability questionnaire, 285
- Engelhardt, N., 490
- Entoderm, 31
- Enuresis, 459
- Environment, effect of, on linguistic development, 204-205
- Errors, of children in reasoning, 235-238
- Eurich, A. C., 450, 476
- Exercise, law of, in learning, 75-77
- Experiment, as a method in child psychology, 16-17
- Experimental group, 16-17
- Extremities, growth of, 120-121
- Extroversion, defined, 446-447
- Eye movements, of the newborn, 93-94; prenatal, 45, in reading, 191-192
- Faber, H. K., 537
- Facial expressions, interpretation of, by pre-school children, 367-368; recognition of, by infants, 361-362
- Fading vs retention, in learning, 62-63
- Fahs, S. L., 419, 421
- Fatigue, muscular, 168-169
- Fear, 302-309; causes of, in children, 302-306; children's responses in, 306; how to handle children's, 307-309; individual differences in, 306-307; useful and harmful effects of, 307
- Feldman, W. M., 30, 33, 38, 123, 124

- Fenton, N., 386, 430, 433, 445, 446
 Fernald, G. M., 413
 Fernberger, S. W., 358
 Fetal period, 30, 33-39; sensory development during, 44-45
 Fillmore, E. A., 473
 Finger-tapping, 155-157
 Fisher, M. S., 177, 185, 201
 Fiske, J., 81
 Fixations, in reading, 192
 Fletcher, J. M., 197, 198, 205
 Foran, T. G., 270
 Forbes, H. B., 45, 95
 Forbes, H. S., 45, 95
 Foster, J. C., 97, 228, 229, 252, 489, 557
 Foster, S., 310
 Francis, K. V., 473
 Freeman, F. N., 121, 220, 242, 274, 521
 Freyer, D., 345, 356
 Friendships, during first five years, 369-371; school, 375-376
 Function, prenatal development of, 39-45
 Furfey, P. H., 270, 375, 376, 389, 433, 544; quoted, 434

 Galen, 436-437
 Galloway, T. W., 490
 Gangs, effect of, upon the child's social development, 388-390
 Garrett, H. E., 58
 Garside, H. V., 123
 Garvey, C. R., 49, 58, 60, 64
 Gates, A. I., 69, 80, 158, 171, 191, 353, 358, 368, 476, 516-518, 521, 522
 General bodily growth, 132-138
 Generalization, 61-62
 Genes, 20-29
 Germ cells, 20-22
 Germinal period, 30-31
 Gesell, A., 14, 17, 52, 56, 81, 104, 141-143, 146, 150-152, 162, 170, 172, 181, 184, 201, 204, 205, 241, 257, 274, 292, 295, 361, 392, 544; quoted, 152-153
 Gilbert, J. A., 155, 168, 169, 215-218
 Ginsberg, H., 40
 Glueck, F. T., 537
 Glueck, S., 537
 Goddard, H. H., 523, 537
 Goodenough, F. L., 12, 14, 17, 69, 97, 155, 156, 201, 242, 252, 271, 284, 289, 292, 297-301, 316, 323, 476, 529; quoted, 299
 Goodspeed, H. C., 485, 509
 Gordon, K., 222
 Grant, J. R., 173, 186
 Grasping, 153-155; development of, 153-155; of newborn infants, 89-90; processes involved in, 153
 Gray, C. T., 191
 Gray, H., 106, 107, 119, 138
 Gray, H. A., 454
 Gregory, C. A., 187, 196
 Grip, strength of, 162-163
 Groups, factors in the formation of, 376-377
 Groves, E. R., 323, 510, 557
 Groves, G. H., 557
 Growth, of the arms, 120-121; in bodily size, Chap. V; bodily, sources of data on, 105-106; of the brain, 130-132; curves of, 208-213; curves of, critical evaluation of, 264-269; curves of, from repeated mental tests, 259-260, 264-265; curves, for weight, 111-112; of the extremities, 120-121, general type, 134; genital type, 134; of the head, 118-119; of the head in circumference, 119; of the heart and blood vessels, 124-126; in height, 106-110, individual differences in, 134-135, of the legs, 120-121; lymphoid type, 134; mental, curves of, during infancy, 259-260; mental, problems of, 207-213; of the muscles, 123-124; of the nervous system, 129-132; neural type of, 134; percentage rate of, 109; rate curves of, 208-213; repeated vs. single measurements, as sources of data on, 105-106; in sitting height, 109-110; of the trunk, 119-120; types of, 134
 Guidance, of children, 547-557; of moral training, 415
 Guilford, R. B., 386
 Guthrie, E. R., 175

 Habits, as elements of character, 398-399; as motives, 341-342
 Haggerty, M. E., 430; quoted, 244, 431
 Hagman, E. R., 303
 Hall, G. S., 5, 6, 8-10; quoted, 9.
 Hall, W. S., 12
 Hall, Mrs. W. S., 153
 Haller, M. W., 94
 Hallowell, D. K., 270, 271
 Halverson, H. M., 54, 154, 155
 Hammett, F. S., 110
 Handedness, and stuttering, 199-200

- Happiness, and the feeling of security, 448-449
 Hartshorne, H., 15, 388, 401, 404-408, 411, 412, 421, 435, 520, 546; quoted, 419-420
 Hartson, L. D., 389
 Hausman, L., 476
 Hazlitt, V., 233
 Head, circumference of, 118-119; control, 141-142; growth of, 118-119; height of, 118
 Head, H., 197
 Health, as a factor affecting social development of the child, 385
 Healy, W., 319, 411, 412, 414, 421, 537
 Hearn, W. J., 509
 Heart, growth of, 124-126
 Heering, G. A., 458
 Hebb, E. F., 233
 Height, annual percentage gain in, 108-109; circumpuberal increase in, 135-138; growth in, 106-110; growth curves of, 107-109; of the head, 118; and intelligence, 523; of the newborn, 106; of private school children, 107
 Height-weight-age tables, 114-117
 Hellman, M., 123
 Hendry, C. E., 389
 Heredity, 20-29; human, 29; Mendelian, 22-24
 Hess, A. F., 123
 Hetzer, H., 361
 Hicks, J. A., 152, 171
 Hierholzer, H. M., 242, 257-259
 Highlander, M., 459
 Hightower, P. R., 413
 Hildreth, G. H., 271
 Hilgard, J. R., 70, 71, 151, 152, 171
 Hill, L. W., 485
 Hirsch, N. D., 270
 Hocking, A., 487
 Hocking, W. E., 421
 Hollingworth, H. L., 10, 15, 80, 428, 476, 510
 Hollingworth, L. S., 378, 379, 454, 523
 Holt, E. B., 37, 44, 175
 Holt, L. E., 485, 486, 509
 Holzinger, K. J., 274
 Hood, M. G., 490
 Hooker, H. F., 386
 Horn, E., 186, 190
 Horn, M. D., 190
 Hoskins, R. G., 295
 Howard, F. E., 510
 Huber, M. B., 353, 355, 358
 Hull, C. L., 51, 58, 428
 Hulst, D., quoted, 419
 Hunger, as source of drive, 329-331
 Hunt, T., 421, 450
 Hunter, W. S., 69
 Hurlock, E. B., 226, 520
 Hygiene, child, 477-510; need for, 477-483; sex, 489
 Ideals, as elements of character, 398-399; as motives, 341-342
 Illness, assumed, 465-466
 Imitation, rôle of, in learning language, 173-175
 Independence, development of, 441-442
 Individual differences, in causes of fear in children, 306-307, in children's morals, 406, in general bodily growth, 134-135; in intelligence, range of, from birth to twelve years, 272-273
 Individuation, in learning, 65-67
 Ineffective personality adjustments, 457-468; anxiety and "nervousness," 466-468, assuming symptoms of illness, 465-466; attention-getting mechanisms, 458; compensation, 460-461, daydreaming, 463-465; enuresis, 459; negativism, 461-463; rationalization, 463; thumb-sucking, 458-459
 Infancy, diffuse and specific reactions during, 101-103; earliest emotional responses of, 286-287; earliest memories of, 221-222; emotional reactions in, 100-101; as a formative period, 81; general theories of behavior during, 82-83, locomotor responses at various ages during, 144-145; motor activity during first two weeks of, 84-86; motor behavior in, 83-92; significance of, 81-83; sleep during, 97-98; as a transitional stage, 81
 Infants, behavior of, Chap. IV; coordination of eyes of, 93, earliest social responses of, 360-361; early feeding movements, 86-87, early specific responses of, 86-92; foot and leg movements, 87-89; laughing of, 98-99; learning of social behavior by, 359-360; locomotion of, during first two weeks, 90-91; ocular pursuit of a moving object by, 93-94; pupillary reflex of, 92-93, reactions of, to light, 92-94; reactions of, to pain stimula-

- tion, 96-97; reactions of, to sound, 94-95; reactions of, to tactile stimulations, 97; reactions of, to temperature, 95-96; responses of, to olfactory stimuli, 95; sensitivity of, to taste, 95; sleep of, 97-98; smiling of, 98-99; social responses of, 359-365; thumb-sucking, 87
- Inferiority, attitude of, 453-455; feeling of, 453-455, and thwarting, 453-455
- Inheritance, blended, 26-27; sex-linked, 24-25
- Instinct theory, 45-46
- Integration, of behavior during prenatal period, 47-48; of character traits, 520; as a principle of learning, 77-79
- Intellectually gifted children, personality traits of, 524-530
- Intelligence, abstract, mechanical, and social, 247-248; altitude, range, area, and speed, 244-245; and children's morals, 409-412; definitions of, 242-245; of delinquents, 537; and emotional maturity, 523; growth of, 242-275; growth curves of, 258-269, and height and weight, 523; kinds of, 247-248; and language, 202-204; levels of, and personality, 524-536, meaning of, 242-248; organization of, 245; and ossification ratio, 521-522; theoretical growth curves of, 266-267; theories of, 245-246; units of measurement of, 251-252
- Intelligence quotient, 249-250, constancy of, 270-272
- Intensity, as a principle of learning, 74
- Interest, and aptitude, 345-346, and attention, 220-221, importance of, during childhood, 344-345, and maturity, 345-346; meaning of, 343-344
- Interests, of children in motion pictures, 356; of children, as motives, 342-357, of children in reading, 353-356, recreational and social, of children, 346-353, vocational, of children, 356-357
- Introversion and extroversion, in children, 447-448; defined, 446
- Irwin, O. C., 17, 18, 48, 82, 84-86, 89, 104, 287, 288, 295; quoted, 102-103
- James, William, 46, 437; quoted, 192
- Jealousy, 309-313; causes of, 309-311; overt behavior of children in, 309, 311-312; among pre-school children, 310-311; treatment of, 312-313
- Jennings, H. S., 21, 28, 33, 48, 415
- Jensen, K., 87, 96
- Jersild, A. T., 80, 171, 206, 241, 274, 295, 305, 323, 392, 450
- Jersild, C. L., 323
- Johnson, E., 485, 509
- Johnson, E. C., 177
- Jones, H. E., 63, 282, 290, 293, 295, 303, 356, 522, 538
- Jones, M. C., 65, 93, 94, 104, 287, 290, 293-295, 303, 309, 323
- Jones, V., 401, 412, 421
- Jordan, A. M., 69, 129, 353, 355
- Jordan, H. E., 30, 37
- Josey, C. C., 177
- Joy, 314-316
- Judd, C. H., 191, 192
- Judgment, development of, 231-240
- Jumping, 149
- Jung, C. G., 437, 446
- Kant, Immanuel, quoted, 86
- Katz, D., 450
- Kawin, E., 476
- Keibel, F., 30, 38, 48
- Keith, A., 8, 30
- Kempf, G. A., 523
- Kindred, J. E., 30, 37, 129
- Knee-jerk, 89
- Knowledge, an element of character, 398-399
- Koch, H. L., 271
- Koffka, K., 10
- Kretschmer, E., 437
- Krueger, L., 177, 178
- Kuhlmann, F., 242, 253, 275
- Kuo, Z. Y., 44
- Landis, C., 295
- Langer, S., 12
- Langfeld, H. S., 80, 295
- Language, children's uses of, 177-178, and chronological age, 200; comprehension of, by children, 180-181, development of, 173-206; development of the sentence, 184; development of sentence structure, 185-186; development of word meanings, 182-183, early vocalizations, 179-180, effect of environment upon, 204-205; egocentric and socialized, 178-179; factors influencing development of, 200-205; the first word, 181-182; functions of, 177-179; Gesell's norms for

- comprehension of, 181; growth of vocabularies, 186-190; how learned, 173-177; imitation in learning, 173-175; influence of physiological condition and motor ability upon, 200-201; and intelligence, 202-204; length of sentences used, 184-185; relation of, to social development, 371-372; sex differences in, 201-202, stages in development of, 179-186; trial and error in learning, 176-177; the word sentence, 184
- Lauer, J., 459
- Laughing, of infants, 98-99
- Laughter of pre-school children, 369
- Law, of developmental direction, 38-39; of proximo-distal development, 39; of structural development, 38-39
- Laws, G., 555
- Leadership, changes in qualities of, with age, 378-379; first manifestations of, 377-378; during first twelve years, 377-379
- Learning, belongingness and, 78, continuity, 74, curves of, 70-72, 77; and development, 49-57, in development of emotional responses, 292-294; insight and, 78-79; integration and, 78; intensity and, 74, and maturation, 49-50; motivation and, 73; prenatal, 50-51; principles of, Chap. III; of social behavior, 359-360; trial and error in verbal, 176-177
- Lecker, G., 146
- Legs, growth of, 120-121
- Lehman, H. C., 348-352
- Lewis, W. H., 8
- Light, reactions of infants to, 92-94
- Lima, M., 353, 355, 358
- Lincoln, E. A., 401
- Lincoln, E. N., 124-126
- Linfert, H. E., 242, 257-259
- Lippitt, L. C., 489
- Locke, John, 8; quoted, 416
- Lockhart, E. G., 410, 411
- Locomotion, development of, 143-152; movements in the infant's walking, 145-146; of newborn infants, 90-91; stages in development of, 143-144
- Lord, E. E., 204
- Lorimer, F., 182
- Lotz, E., quoted, 419-420
- Luh, C. W., 267
- MacDonald, A., 119
- MacQuarrie, T. W., 247
- Magni, J. A., 173, 186
- Mall, F. P., 30, 38, 48
- Mallay, H., 97
- Maller, J. B., 388, 401, 421, 433, 435
- Malnutrition, 480-481
- Mann, I. C., 38
- Markey, F. M., 323
- Markey, J. K., 186, 204
- Marquis, D. P., 66, 67
- Marston, L. R., 447-448; quoted, 432
- Mason, B., 389
- Mass activity, during fetal period, 43-44; of infants, 101-103; significance of, 102-103
- Mastery, as a motive, 340; as a personality trait, 445-446
- Mateer, F., 59, 60, 63, 557
- Matheson, E., 233
- Mathews, E., 285, 537
- Mattson, M. L., 70, 71
- Maturation, in development of emotional responses, 290, 292; and learning, 49-50; vs. practice in stair-climbing, 151-152; prenatal and post natal, 49-53
- Maturity, emotional, of children, 321-322; relation of, to interest, 345-346
- Maul, R., 227
- May, M. A., 15, 388, 401, 404-408, 411-414, 421, 435, 520, 546
- McArthur, C. G., 129
- McCarthy, D., 14, 17, 173, 177-180, 183-186, 190, 200-205
- McDougall, W., 404
- McGinniss, J. M., 93
- McGraw, M. B., 90
- McLaughlin, A. J., 490
- McLaughlin, Sister M. A., 445
- Mead, C. D., 146, 201, 202
- Measurement, of character, 400-403; as a method in child psychology, 14-15; of personality traits, 425-436
- Meek, L. H., 80, 206, 241, 274
- Meltzer, H., 373
- Memory, of children and adults, 229-231; the child's earliest, 221-223; development of, 221-231; for digits, 225-226; the golden age for, 231; growth curves of, 224-229; immediate verbal, 225-228; logical, 228, for objects, pictures, and movements, 223-224; verbal, with delayed recall or reproduction, 228-229

- Mendel, G. J., 22-24
 Mengert, I. G., 180, 201, 369
 Mental abilities, organization of, 517-520
 Mental age, 249
 Mental functions, development of, 207-241
 Mental health, meaning of, 495
 Mental hygiene, of childhood, 495-509,
 and the church, 507-509; in the elemen-
 tary school, 504; in the home, 500-503,
 in the nursery school and kindergarten,
 503-504; program for children, 497-500
 Meredith, H. V., 106, 108, 111, 138, 515
 Merrell, M., 106
 Merrill, M., 253-257, 275
 Mesoderm, 31
 Methods, case studies, 13; of child psy-
 chology, 3-6, 10-17; importance of, 3;
 inadequate, 3-6; superficial observation,
 3-4
 Miner, J. B., 537
 Minkowski, M., 42, 103
 Mitchell, A. M., 356, 414
 Mohr, G. J., 103, 459
 Monroe, M., 206
 Montessori, M., 167
 Montgomery, R. B., 428
 Moore, K. C., 12, 153
 Moore, T. V., 476
 Moral development, stages in, 403-406
 Moral training, guidance of, 415
 Morals, of children, factors influencing,
 407-415; effect of associates upon, 412;
 effect of clubs, camps, and play activities
 upon, 413-414; effect of the home upon,
 412; effect of motion pictures upon, 414;
 effect of school and church upon, 413
 Morgan, J. J. B., 476
 Morgan, T. H., 21, 26, 29
 Morris, H., 30
 Morse, J. L., 485
 Mortality, 481-483
 Moss, F. A., 510
 Motion pictures, children's interests in, 356;
 effect of, upon children's morals, 414
 Motivation, during childhood, 324-358;
 importance of, 326-327; from instinctive
 drives, 327-328; meaning of, 325-326;
 as a principle of learning, 73-74
 Motives, of children, 326-336, children's
 interests as, 342-357; conformity, 340-
 341; development of, 336-342; habits as,
 341-342; ideals as, 341-342; modifica-
 tion of, 337-339; native and acquired
 factors in, 336-337; preeminence or
 mastery, 340; prestige, 339; purposes as,
 341-342; security, 339-340; social, 339-
 341; sources of, 329-336
 Motor abilities, development of, 139-172;
 organization of, 516-518; of pre-school
 children, 165-166; of school children,
 166-168; tests of, 165-168
 Motor activity, during first two postnatal
 weeks, 84-86
 Motor control, steadiness of, 161-162
 Motor coordination, 139-141
 Motor development, principles of fetal,
 43-44; sequence in, 140-141
 Motor habits, in reading, 191-192
 Moyes, J. S., 37
 Muehlenbein, J., 270, 544
 Murchison, C., 12
 Murphy, G., 80, 295, 358, 392, 450
 Murphy, L. B., 392
 Muscles, control of, 139-140; fatigue of,
 168-169; growth of, 123-124; strength
 of, 162-164; variability in strength of,
 163-164
 Myerson, A., 391, 421
 Nature vs. nurture, in development of
 motor capacities, 170-172; in mental
 growth, 274
 Nature vs. learning in walking, 149-152
 Negativism, 461-463
 Nelson, A. K., 38, 45, 55, 82, 84-87, 89,
 94-96, 101, 102, 287-289
 Nervous system, autonomic division of,
 278-280; early growth of, 129-132; pre-
 natal development of, 37-38; rapid
 growth of, before birth, 129-130
 Neural tube, 37
 Newborn, weight of, 110
 Newman, H. H., 274
 Newmark, E. D., 226, 520
 Nice, M. M., 12, 190, 201
 Nicolson, G. H. B., 126
 Norsworthy, N., 9
 Nucleus, 20
 Nudd, H. W., 557
 Nulliplex, 23
 Nursery school, effect of, upon social de-
 velopment, 387-388
 Objective attitude, in child care and train-
 ing, 554-557
 O'Brien, J. A., 191

- Observation, directed, as a method in child psychology, 13-14; uncontrolled, as a method in child psychology, 3-4
- Odom, C. L., 269
- Olfactory responses, of infants, 95
- Olson, W. C., 14, 421, 430, 510, quoted, 431
- Optic nystagmus, in early infancy, 93
- Organismic hypothesis, 102-103
- Organization, of mental abilities, 517-520; of motor capacities, 516-518; of traits of children, 511-538
- Original nature, instinct theory of, 45-46, older views of, 45-47, reflex theory of, 46-47
- Orleans, J. S., 430
- Ossification, 121-123
- Ossification ratio, and intelligence, 521-522
- Otis, M., 435, 436
- Pain, sensitivity to, 215; sensitivity of infants to, 96-97
- Parker, G. H., 38, 129
- Partridge, G. E., 72
- Patellar reflex, 89
- Paterson, D. G., 247, 521, 538
- Patry, F. L., 510
- Pavlov, I. P., quoted, 103
- Paynter, R. H., 412
- Pearson, K., 11
- Peiper, A., 50
- Pelsma, J. R., 173
- Percentile ranks, 250-251
- Perception, of colors, 215-217; tactual, 216, 218; of time, 218
- Perceptual capacities, development of, 213-218
- Perez, B., 12
- Personality, and adjustment, 456-457; constancy of early patterns of response, 440-441; earliest differences in, observed, 439-440; and levels of intelligence, 524-536; meaning of, 422-425; normal, 449-450; rating scales, 429-432; tests, 435-436
- Personality adjustments, of children, 451-476; ineffective, 457-468
- Personality traits, of children of average mental ability, 530-533; of delinquent children, 537-538; development of, 438-450; of intellectually gifted children, 524-530; measurement of, 425-436; of mentally dull children, 533-536
- Personality types, 436-438
- Peterson, F., 45
- Peterson, J., 168, 242
- Peterson, R. C., 414
- Physical defects, 481-482; correction of, 490-491
- Physical development, predicting, 543
- Physical maturity, general or specific, 513-516
- Physical traits, of delinquents, 537, interrelations of, 513-516
- Physical welfare of children, 483-495; factors affecting, 484-494; a program for, 494-495
- Physiological gradient, 33
- Physique, as a factor affecting social development of the child, 385
- Piaget, J., 14, 17, 205, 241, 415
- Pintner, R., 80, 242
- Plantar reaction of infants, 87-89
- Play, group, 384, individual, 383-384; and physical welfare of the child, 488-489; social development shown by, 383-384
- Play activities of children, 346-353
- Pleasure, 314-316
- Polar bodies, 21
- Porter, W. T., 521
- Porteus, S. D., 129, 436
- Posture, 141-142
- Powers, F. F., 391, 413
- Practice vs. maturation in stair-climbing, 151-152
- Pratt, K. C., 38, 45, 55, 82, 84-87, 89, 94-96, 101, 102, 104, 287-289
- Prediction, of child behavior, 539-547, of general tendencies, 542; of individual differences, 542; of intellectual development, 543-544, methods of, 539-540; of moral and religious development, 546-547; of physical and motor development, 543; relation of, to control, 547-548; of scholastic achievement, 544-545; of social development, 546
- Prehension, 153-155
- Pre-school children, interpretation of facial expressions by, 367-368; laughter and crying of, 369; social behavior of, 365-372
- Prescott, D. A., 188, 522
- Pressey, S. L., 285, 323, 355, 509
- Prestige, as a motive, 339
- Preyer, W., 12, 86

- Proximo-distal development, during fetal period, 44; law of, 39; sequence in, 54
- Psychogalvanic reflex, 282
- Puberty, effect of, upon height and weight, 136-138
- Puffer, J. A., 389
- Pulse rate, changes in, during childhood, 126-127
- Punishment, place of, in child care, 551-552
- Pupillary reflex, of infants, 92-93
- Purposes, as motives, 341-342
- Pyle, W. H., 155, 157
- Pyle, W. M., 218, 225
- Pyle, S. I., 123
- Pyles, M. K., 203
- Questionnaires, of direct facts, 5; of reminiscence and opinion, 6
- Rainey, L. H., 45
- Ramsey, W. R., 110
- Rating scales, 15, 403
- Rationalization, 463
- Raubenheimer, A. S., 401
- Ray, W. S., 51, 96
- Razran, G. H. S., 58, 62, 68
- Reading, analysis of, 191-192; complexity of, 191; development of, 190-197; eye movements in, 191-192; fixations in, 192; importance of, 190; interests of children, 353-356, for meaning, 192-194; oral, improvement in, 194; selecting word meanings in, 192-194; silent, improvement in, 195, visual perception span in, 192; vocabularies in, in grades one to six, 195-196
- Reasoning, during childhood, 232-233; of children and adults, 239-240; of children from six to twelve years, 233-235; children's errors in, 235-238; development of, 231-240; growth curve of, 234; of pre-school children, 233
- Recapitulation theory, 8-9
- Recessive traits, 22-23
- Reflex of infants, Babinski, 88-89; grasping, 89-90; knee-jerk (patellar), 89; plantar, 87-89; pupillary, 92-93; theory of, 46-47; wink, learning to control, 72
- Reininger, K., 374
- Religious beliefs, development of, 415-419
- Religious education, of the child, 419-421
- Respiratory system, 127-129
- Responses, conditioned, 57-68; of infants to adults, 363-364; of infants to presence of other infants, 362-363, 365, social, of infants, 359-365
- Rest and sleep, and motivation, 334
- Reward, place of, in child training, 551-552
- Reynolds, M. M., 97, 461
- Richards, T. W., 17, 89
- Richardson, F. H., 509
- Richey, H. G., 125, 126, 134-136
- Ripin, R., 87
- Ritter, A. J., 537
- Robbins, S. D., 197
- Rock, R. T., 476
- Rogers, J. E., 489, 509
- Rogers, K. H., 537
- Rombach, J., 374, 378
- Rosanoff, A. J., 449, 497
- Rose, M. S., 485, 509
- Rousseau, J. J., 7
- Rugg, H. O., 177, 178
- Ruggles, A. M., 435
- Running, 148-149
- Rust, M. M., 462
- Sachs, B., 476
- Sacral. *See* Autonomic nervous system
- Salusky, A. S., 390-391
- Sandiford, P., 69, 80, 274
- Sargent, M. K., 440
- Sawtell, R., 123
- Sayles, M. B., 557
- Scammon, R. E., 33-36, 38, 39, 48, 106-110, 123, 129, 131, 134
- Scheidemann, N. V., 197, 205, 476
- Schmidt, W. A., 191
- Schoen, M., 69
- School buildings and grounds, 479-480
- Scientific method, in child psychology, 10-17
- Scott, A. W., 158, 516-518
- Scott, W. D., 428
- Seagoe, M. V., 356
- Seashore, C. E., 216
- Security, as a motive, 339-340
- Self-confidence, development of, 441-444
- Self-control, development of, 444
- Sensitivity, to pain, 215; to taste stimulations, 95
- Sensory capacities, development of, 213-218
- Sensory mechanisms, prenatal development of, 38

- Sentences, length of, used by children, 184-185; structure of, 185-186
- Sex, and motivation, 334
- Sex differences, in language development, 201-202
- Sex hygiene, 489
- Shaffer, L. F., 281, 358, 401, 452, 476, quoted, 288
- Sheldon, H. D., 389
- Shepard, J. E., 149
- Sherman, I. C., 48, 53, 86, 88, 91-93, 96, 97, 104, 274, 283, 287, 289, 295
- Sherman, M., 48, 53, 86, 88, 91-93, 96, 97, 104, 274, 283, 287, 289, 295, 510
- Shields, F. J., 401
- Shinn, M. M., 12, 153
- Shirley, M. M., 51, 53, 104, 140-143, 149, 171, 172, 179, 201, 203, 205, 218, 222, 223, 241, 259, 260, 270, 392, 450, 538, 543; quoted, 171
- Sholty, M., 196
- Shuttleworth, F. K., 401, 412
- Sickness, among children, 481
- Simon, T., 15, 242
- Simplex, 23
- Sims, V. M., 274
- Sitting, development of, 142
- Sitting height, growth in, 109-110; ratio of, to standing height, 109-110
- Skinner, C. E., 69, 80
- Sleep, of infants, 97-98; of newborn infant, 83; and rest need by children, 486-488
- Smedley, F. W., 226
- Smiling, of infants, 98-99
- Smith, M. E., 146, 177, 181, 185-188, 190, 200-205
- Smith, R. B., 454
- Smith, R. S., 358, 551
- Smith, S., 175
- Snyder, A. D., 177
- Social behavior, of elementary school children, 373-377; kinds of, observed in infancy, 363-365; the learning of, 359-360; of pre-school children, 365-372
- Social concepts, of children six to twelve years of age, 373-374
- Social contacts, of later childhood, 374-375
- Social development, as affected by the family, 385-387, as affected by play and other recreational activities, 387; of children, 359-392; factors affecting, 384-391; influence of clubs, camps, and gangs upon, 388-390; influence of the nursery school on, 387-388; influence of the social order on, 390-391; of pre-school children, 365-372; after the pre-school years, 373-377; relation of language to, 371-372; as shown by play, 383-384
- Social order, effect of, upon the child's social development, 390-391
- Social responses, after infancy, 365-377; of infants, 359-365
- Sondergaard, A., 177-178
- Sound, reactions of infants to, 94-95
- Spalding, D. A., 149
- Spearman, C., 242, 245, 246, 275
- Specialization, in learning, 65-67
- Speech defects, 197-200
- Speed, of voluntary movement, 155-159
- Spencer, H., quoted, 477
- Spillman, R., 124, 125
- Stammering, 197-200
- Standing alone, age of, 142; stages in development of, 142
- Starr, A. S., 226
- Statistical methods, use of, in child psychology, 15-16
- Steadiness of motor control, development of, 161-162
- Stecher, L. I., 155, 158-160, 167, 223, 224, 241, 264, 265, 274, 391
- Stenquist, J. L., 247
- Stern, W., 12, 93, 241, 243
- Stinchfield, S. M., 197
- Stoddard, G. D., 18, 80, 84, 94, 172, 205, 241, 275, 323, 392, 421, 476
- Strayer, G. D., 490
- Streeter, G. L., 32
- Strength, of back, 163; of grip, 162-163, of legs, 163; muscular, 162-164; ratios of, to height and weight, 164
- Stroud, J. B., 227
- Structure, prenatal development of, 29-39
- Stubbs, E. M., 94
- Stutsman, R., 158, 159, 167, 224, 242, 252, 258, 265
- Stuttering, and handedness, 199-200; theories of, 198-199
- Submission, 445-446
- Substitution, place of, in child care and training, 551-552
- Suggestibility, test of, 435
- Sun, K. H., 38, 45, 55, 82, 84-87, 89, 94-96, 101, 102, 287-289
- Sutherland, G. F., 40
- Sweet, H. F., 419, 421

- Sweet, L., 433
 Sylla, D., 378
 Symonds, P. M., 400, 401, 421, 428, 429, 450, 510
- Tactual perception, 216, 218
 Taste, sensitivity of newborn infants to, 95
 Taylor, G. A., 171, 523
 Taylor, H. R., 413
 Taylor, R., 110
 Temperature, reactions of infants to, 95-96; unfavorable, as source of drive, 332-333
 Temper tantrums, of young children, 302
 Terman, L. M., 15, 129, 201, 202, 216, 226, 227, 238, 242, 253-257, 275, 353, 355, 358, 378, 409, 410, 435, 480, 481, 487, 509, 529, 538; quoted, 244
 Tests, of knowledge and attitudes, 402-403; motor, for pre-school children, 165-166
 Thirst, as a source of drive, 331
 Thom, D. A., 323, 557
 Thomas, D. S., 14, 18, 450
 Thompson, H., 52, 150-152, 170, 201, 274; quoted, 152
 Thompson, M. K., 358
 Thoracico-lumbar. *See* Autonomic nervous system
 Thorndike, E. L., 8, 15, 46, 168, 190, 191, 236, 242, 246, 252, 268, 269, 273, 275; quoted, 6, 9, 244, 245
 Thrasher, F. M., 375, 376, 389
 Thumb-sucking, 458-459
 Thurstone, L. L., 242, 252, 265, 268, 273, 275, 401, 414; quoted, 244
 Thwarting, 452-456
 Time, estimation of short intervals of, by children, 218
 Time sampling, 14
 Tinker, M. A., 155, 156
 Tobey, J. A., 490
 Touch, sensitivity of infants to, 97
 Town, C. H., 202
 Traphagen, V., 476
 Travis, L. E., 197, 198, 205, 206
 Trial and error, as a principle of learning, 69-73
 Trommer, E., 97
 Trow, W. C., 358, 391, 476
 Trunk, growth of, 119-120
 Tudor-Hart, B. E., 407, 408
- Unconditioning, 63-65
 Unsatisfactory living conditions for children, 477-479
 Utility theory, 9
- Van Alstyne, D., 181, 204, 489
 Van Dyke, G. E., 136-138
 Van Wagenen, M. J., 252
 Variability in muscular strength of children, 163-164
 Vierordt, K. H., 124, 130
 Visual perception span, in reading, 192
 Vital capacity, changes in, during childhood, 127-129
 Vocabularies, growth of, 186-190; kinds of, 186, methods of studying, 186-187; parts of speech used in, 188-189; parts of speech used by children in conversation, 189-190; in reading, in grades one to six, 195-196
 Vocal expression, recognition of, by infants, 361-362
 Vocalizations, earliest, 179-180
 Vocational interests of children, 356-357
 Voelker, P. F., 401
 Voluntary movements, speed and accuracy of, 155-162
 Vomiting, of newborn infants, 91
- Wada, T., 330
 Wagner, M. A., 97
 Wagoner, L. C., 69, 80, 172, 205, 392
 Walking, age of, 144-145; movements in the, of infants, 145-146; nature vs. learning in, 149-152; significance of age of, 146-147
 Wallin, J. E. W., 197, 476, 510
 Wallis, R. S., 106, 109-112, 118-120
 Walsh, M. E., 387
 Warren, H. C., 69, 280, 391, 450
 Washburn, R. W., 98, 99, 292, 362, 440
 Waterhouse, E. H., 459
 Watson, G. B., 401, 421, 435
 Watson, J. B., 46, 90, 287, 288, 310, 424
 Webb, E., 15
 Weber, C. O., 523
 Weight, circumpuberal increase in, 135-138, growth in, from birth to twelve years, 110-117; and intelligence, 523; of the newborn, 110; of private school children, 112; yearly percentage gain in, 112-113
 Weight-height-age tables, 114-117
- Uhl, W. L., 353

- Weinstock, M , 123
 Weiss, L A , 94
 Weld, H. P , 80, 295
 Wellman, B L , 18, 80, 84, 94, 160, 172,
 180, 201, 205, 241, 271, 275, 323, 375,
 387, 392, 421, 476
 Wendle, M., 191
 Wendt, G. R., 64
 Wenger, M A , 67
 Whipple, G. M., 167
 White, R. R., 433
 White, W. A , 510
 Whitley, M T., 9
 Wickes, F G , 557
 Wickman, E K , 430, 474-476; quoted,
 431, 475
 Williams, F E , 495, 509, 557
 Williams, H D , 473
 Williams, H. W , 216
 Williams, J F , 488, 490
 Williams, J W., 33
 Williams, M L , 269
 Wilson, C. A , 106
 Wingheld, A. H., 274
 Wink reflex, learning to control, 72
 Witty, P A , 275, 348-352
 Wolff, L V , 146
 Wood, T D , 114-117, 490
 Woodbury, R M , 106, 138
 Woodworth, R. S , 69, 80, 149, 172, 275,
 285, 295, 328, 358, 450, quoted, 149
 Woolley, H. T , 13, 525
 Worcester, D A , 386
 Wyman, E T , 485
 Wyman, J , 191
 X-chromosome, 24
 Yates, D H., 426
 Y-chromosome, 24
 Yepsen, L. N , 431
 Ziskin, T., 124, 125
 Zyve, C. I., 180